AIR CONDITIONING HEATING & REFRIGERATION NEWS
The Newspaper of the Industry
RESIDENTIAL — COMMERCIAL — INDUSTRIAL
September 21, 1959
Issued every Monday at 450 West Fort St., Detroit 26, Michigan
Established 1926
Member, Associated Business Publications (ABP) (ABC) Member, Audit Bureau of Circulations
Vol. 88, No. 3, Serial No. 1,591
Trade Mark Registered U.S. Patent Office. Copyright 1959, by Business News Publishing Co.
Subscription Price, $6 Per Year (U. S. and Canada). Foreign: $10.00 Per Year.
Reentered as second class matter October 3, 1936, at the post office at Detroit, Mich., under the Act of March 3, 1879.

Inside Dope

By GEORGE F. TAUBENECK

Learn to live and laugh — thus delay your epitaph

Stories of the Week
Thoughts for the Week
Right Hand Knoweth Not
Out of Our Mailbag

Stories of the Week

It was a hot evening late in August when Bill Andrews of Fort Wayne, Ind., decided to treat his four kids to ice cream cones.

News of this sort speeds over the jungle grapevine faster than radar. By the time Mr. Andrews could close the doors of his little Simca French import sedan, his wife and three neighbor children also had packed aboard.

Bill parked at a drive-in beside a big Buick. Its lone occupant, an unsmall woman, looked over and down at the sardined Simca, and grinned broadly.

Inspired, Mr. Andrews spoke out, loudly and peevishly:

"I've had it! If we can't find a Motel tonight, I'm going home by train. The rest of you can sleep in the car again."

"Sure," said Mrs. Coffeeclatch, "my husband has plenty of faults.

"But I'm not sorry, really. I like to nag."

Thoughts for the Week

The trouble with some weddings is that the only thing the couple has in common is admiration for the same bride.— KEN & PAT KRAFT.

You can always tell luck from ability by its duration.— *Grit.*

Freedom under Communism may be more complete than it is in America because the Soviet citizen is free from having to choose his leaders. Are you listening, Nikita?

Right Hand Knoweth Not

Practically everything now known about the "heat pump" (including a great deal which most people didn't suspect was known!) can be found in this issue of the NEWS.

Frank Versagi and associates on the NEWS editorial staff have made this issue a liberal education in itself.

It won't make everybody happy, however. Ears will burn, faces redden, veins bulge, eyes pop at some of the inside information presented.

And, sure as shootin', "Dope" will be chewed out in person and

(Concluded on Page 8, Col. 1)

Sales Soaring, but . . .

'Orderly Growth' Advocated for Heat Pump

DETROIT—Heat pumps are soaring in sales and broadening their geographical impact.

Manufacturers' shipments of central heat pumps are running 100% over last year; at this rate, between 35,000 and 50,000 will be shipped by the end of the year.

Most producers report the ratio of heat pump-to-air conditioner sales increasing rapidly; one or two find 50% of their productive capacity going to heat pumps. These reports reflect the increasing share of air conditioning shipments being captured by the heat pump—from 0.8% in 1953, through 4.3% in '57, to 7.8% last year. If the present rate of shipments continues through the year, this figure will approach 15% for 1959.

Another factor favoring increased heat pump production in the years to come is the frequently voiced opinion that air conditioners are in for a major redesign in compressor application and coil configuration. "Why not set up to mass produce heat pumps only, which can be used for cooling alone if desired?"

Proof that heat pumps are leaving home—Florida—is found in the facts that 16.9% of 1958 central heat pump sales went to California; 13% went to Georgia, 10% to Florida. From Arizona which captured almost 7% of 1958 sales comes word of the formation of what is thought to be the first heat pump distributor association.

Sixty-two per cent of heat pump sales are going residential; the remaining 38% going into commercial and industrial applications. Military housing is a large factor in heat pump growth, and military experience will have a significant bearing on general acceptance of the year-round equipment.

"Fifty million residential and rural customers are now being served by the electrical utilities," points out a utility spokesman. "Only 1% of these have central heating-cooling; only 11% have installed room air conditioners. Eighty-eight per cent of the market is open for cultivation and development."

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A Total Look at heat pump progress is presented in this special issue. Index on this page indicates the comprehensive coverage which makes this Heat Pump Issue an unequalled reference source.

Military Experience 'Good'

WASHINGTON, D. C. — "Problems encountered with heat pumps in military installations are abnormal neither in scope nor number," states a government official.

This summarizes the Military's evaluation of its existing heat pump installations. (Total of installed and contracted for heat pumps on military bases exceeds 9,000; overwhelming number of these are on Air Force housing projects.)

Following is the text of a statement to the NEWS from Max Barth, chief of the Technical Division, Office of the Assistant Secretary of Defense.

Within the military departments, heat pumps have been installed to date only in Air Force family housing projects. Seven of these projects are new Capehart projects where heat pumps have been or are being installed as part of the initial construction.

These projects are located at Little Rock Air Force Base, Arkansas; Myrtle Beach Air Force Base, South Carolina; Seymour-Johnson Air Force Base, North Carolina; Patrick Air Force Base, Florida; Homestead Air Force Base, Florida; Columbus Air Force Base, Mississippi; and Beale Air Force Base, California. One existing Wherry project, at Patrick Air Force Base, has been equipped with heat pumps as part of an improvement and modification program. (Editor's Note: Several other bases are installing heat pumps. Among them Cape Canaveral.)

Our experience with heat pumps has been good. There have been a number of problems, but strictly speaking, many of these have not been attributable to heat pumps.

Some of these projects have not yet been completed, and the first installation has a substantial number of units still under the manufacturer's warranty.

For example, at one base the electrical distribution system, although designed in accordance with the recommendations of the local utility, was not of sufficient capacity for an all-electric house. In addition, there have been some limited problems with air distribution, thermostat location, noise level, and similar difficulties which, of course, are independent of the

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'For a Few Months'

Air Force Halts Heat Pump Purchases

WASHINGTON, D. C.—"For the next few months at least, we will not be purchasing any more heat pumps," states an Air Force spokesman who adds "this is official Air Force policy," although he asked not to be identified.

The decision does not reflect on the performance of heat pumps, as such, he emphasized. As indicated in accompanying stories, the military is in general satisfied with the cooling and heating performance of these units.

"But the industry, and I mean not just one or two manufacturers, have given us information which led us to establish a service and maintenance cost of about $30 per unit per year. However, on existing installations, the cost has proved to be considerably higher. In some areas, contractors are asking $50 per year per unit for labor alone, parts extra."

With some 8,800 units in its inventory, installed and contracted for, the Air Force feels it is "reasonable and sensible" to delay further purchases of heat pumps until further study is completed, the official indicated. "Either through our own or other experience, the industry must prove to us that the heat pump can be more economically maintained in multiple installations of 500 or more, he insisted.

Silver Shield Starts In Philadelphia

PHILADELPHIA—As part of the nationwide campaign to upgrade and improve the heating and cooling system in houses, the Silver Shield Program has come to the greater Philadelphia area.

Since the first week in April, heating and cooling dealer-contractors have been meeting to organize the Indoor Comfort Bureau of Delaware Valley, Inc., the forerunner to Silver Shield installations.

During recent months a

(Concluded on Back Page, Col. 2)

Existing Homes Pass New In Cooling Jobs

SYRACUSE, N. Y.—The year 1959 will be witness to three major break-throughs in consumer purchases of central residential air conditioning systems, Carrier Corp. officials declare following a survey of industry sales.

The total number of central residential systems installed this year is expected to break through a "plateau" in the range of 140,000 units which had existed since 1956. The estimated sales of 200,000 units

(Concluded on Page 43, Col. 3)

IRS Schedules Hearing on Tax Ruling

WASHINGTON, D. C. — The Internal Revenue Service has scheduled a hearing for Sept. 29 on the proposed new Treasury Department regulation governing the application of the Federal excise tax of 10% on all room air conditioners, and the 5% tax on household refrigerators and freezers.

The hearing will be held in Room 3313 of the Internal Revenue Building here, starting at 10 a.m., according to a notice of the hearing published in the *Federal Register* of Sept. 16. The notice was signed by Maurice Lewis, director of the Technical Planning Div. of IRS.

Persons who plan to attend the hearing are requested to notify the Commissioner of Internal Revenue, Attention: T.P., Washington 25, D. C., by Sept. 25.

Spokesmen for the Air-Conditioning & Refrigeration Institute and the National Electrical Manufacturers Association emphasized that their groups had not asked for the hearing.

However, ARI will file a brief and be represented at the hearin, the institute spokesman said. The NEMA spokesman said that as of Sept. 16, "our members had not been informed of the fact that a hearing is to be held" and therefore had no immediate comment concerning it.

'House Beautiful' To Feature Heat Pump Article by Versagi

"Meet the Heat Pump"— A non-technical explanation of the heat pump written by NEWS technical editor Frank J. Versagi will appear in the November issue of "House Beautiful," a major shelter magazine.

In layman's language, the article describes reverse cycle operation and briefly summarizes heat pump experience around the country.

Heat Pumps May Total 7.2% of Room Unit Sales

DETROIT—Just over 5% of room unit sales this year have been heat pumps, according to data gathered by the NEWS. The customary late fall surge of heat pump sales is expected to bring this figure close to 1958's 7.2% —110,000 units last year.

Reports from utilities and distributors in some areas of the country show the ratio of room-to-central heat pumps dropping slightly. Simultaneously, the average tonnage of heat pump installations in these areas is rising from just over 2 tons a couple years ago to over 3 tons now.

Industry sources estimate that there are presently 250,000-300,000 room unit heat pumps installed in the country.

Heat Pump Enjoys Robust Youth In Australia

GLEBE, N.S.W., Australia—"The heat pump is enjoying a robust youth in Australia," reports Karloss Morton of Heat Pump Mfg. Co., here.

"Our production is chiefly air-to-air equipment in sizes of 3, 6, 9, 12, 18, 28, 36, 42, 50, 60, 75, and 100 tons. A number of principal window unit manufacturers released 1 and 1½-ton models late last season, and several more manufacturers are expected to join them this season," Morton reports.

Relative to climate and utility rates, the two most important factors in heat pump applications, A. E. Merryful of the same company explains "Summer varies from 90-95° to as much as 110-115° in some areas for several days and nights on end. During winter these same districts drop to about 30°, although there are a few isolated areas which drop to 15-20°."

Merryful, who is also technical director of the Australian ASHRAE, indicates that power costs are typified by those in Sydney, where they are equivalent to 3 cents per kwh. for domestic power and 5 cents for commercial power up to 10 hp., at which point the rate is reduced to 3 cents.

The company's heat pumps have been installed in homes and commercial and industrial applications, and it claims to have been the manufacturer of the "first fully automatic heat pump installed in a multi-story building in Australia."

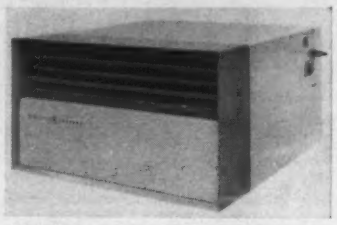
"We will be extremely pleased to hear from any heat pump manufacturers in the United States with a view to exchanging ideas and opinions."

John I. Trimble, General Manager Of Janitrol, Dies

COLUMBUS, Ohio — John I. Trimble, 54, a vice president of Surface Combustion Corp. and general manager of its Janitrol Heating & Air Conditioning Div., died recently in White Cross hospital.

Trimble joined the Engineering Dept. of Surface Combustion in Toledo in 1928. He was Janitrol district sales manager of the Pittsburgh office from from 1931 until 1938 when he was named manager of engineering of the Janitrol Div. here. He became a vice president of the corporation in 1957 and was appointed Janitrol general manager earlier this year.

Surviving are his wife, Dorothy H., two daughters, and two brothers.



PROGRESS in heat pump design is indicated by the contrast between the air handling section of G-E's new 4-ton split-system heat pump shown above and the self-contained Weathertron heat pump first introduced in 1951 which is shown below.

any way you look at it, you see

durability

in the

MARLEY

driCooler

DriCooler air cooled refrigerant condensers are engineered in every detail to emphasize the three R's — rigid, rugged, reliable — that combine to produce DURABILITY. Top or bottom, inside or out, the results are completely visible.

A glance at the overall unit shows that the structure that houses mechanical equipment and coils is heavy gauge steel throughout, rigidly braced and fabricated to prevent vibration and vibratory sound. It is hot-dip galvanized after fabrication to add years of service life through ability to resist rust and corrosion.

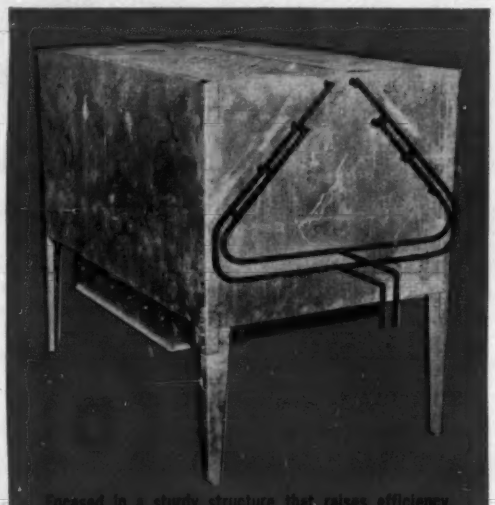
Look through the convenient access door: you see heavy-duty, industrial type mechanical equipment supported by an X-frame of heavy steel beams. Adjustably mounted motor, V-belt drive; rugged, lubricated bearing housing and fan are retained in alignment for wearproof operation.

From below, the fan is in view. It is a plus value of every DriCooler and its ability and reliability are backed by the experience of thousands in service. Here, too, is the screen (there is another on top) that protects equipment and personnel. To this may be added the automatic shutter that maintains operating efficiency during periods of critical dry-bulb temperatures.

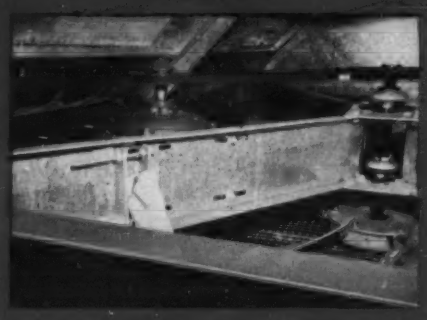
Any way you look at them, DriCoolers merit your careful consideration. Let us send you Bulletin DCR-59 that explains every advantageous detail, or call your local Marley Engineer in 56 major cities.

THE MARLEY COMPANY

Kansas City, Missouri

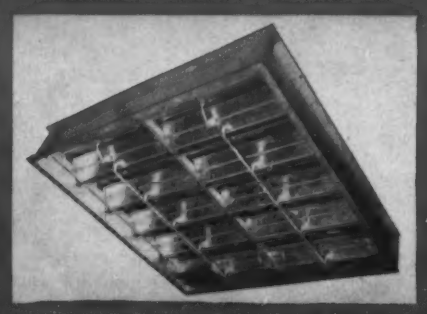


Encased in a sturdy structure that raises efficiency, confines sound.



Heavy-duty mechanical equipment positively retained in proper alignment.

Marley fan with unequalled record of performance; protective screen.



Functional shutter practicalizes operation in low temperature periods.

G-E Bows 4-Ton Split-System Heat Pump

TYLER, Texas—A new 4-ton "Weathertron" split-system heat pump has been made available by General Electric Co.'s Air Conditioning Dept. here, it was announced by C. B. Ramsdell, marketing manager.

The outdoor unit (WTA48B) is housed in a two-tone, weather-resistant cabinet, and features the G-E full-hermetic compressor; large, permanently-lubricated ball bearing blowers, G-E blower motors; electrically operated, positive-acting 4-way switchover valve; unified, automatic electrical controls for heating, cooling, and fully-automatic defrosting; high efficiency driers; and service valves to simplify installation and start-up, according to the firm.

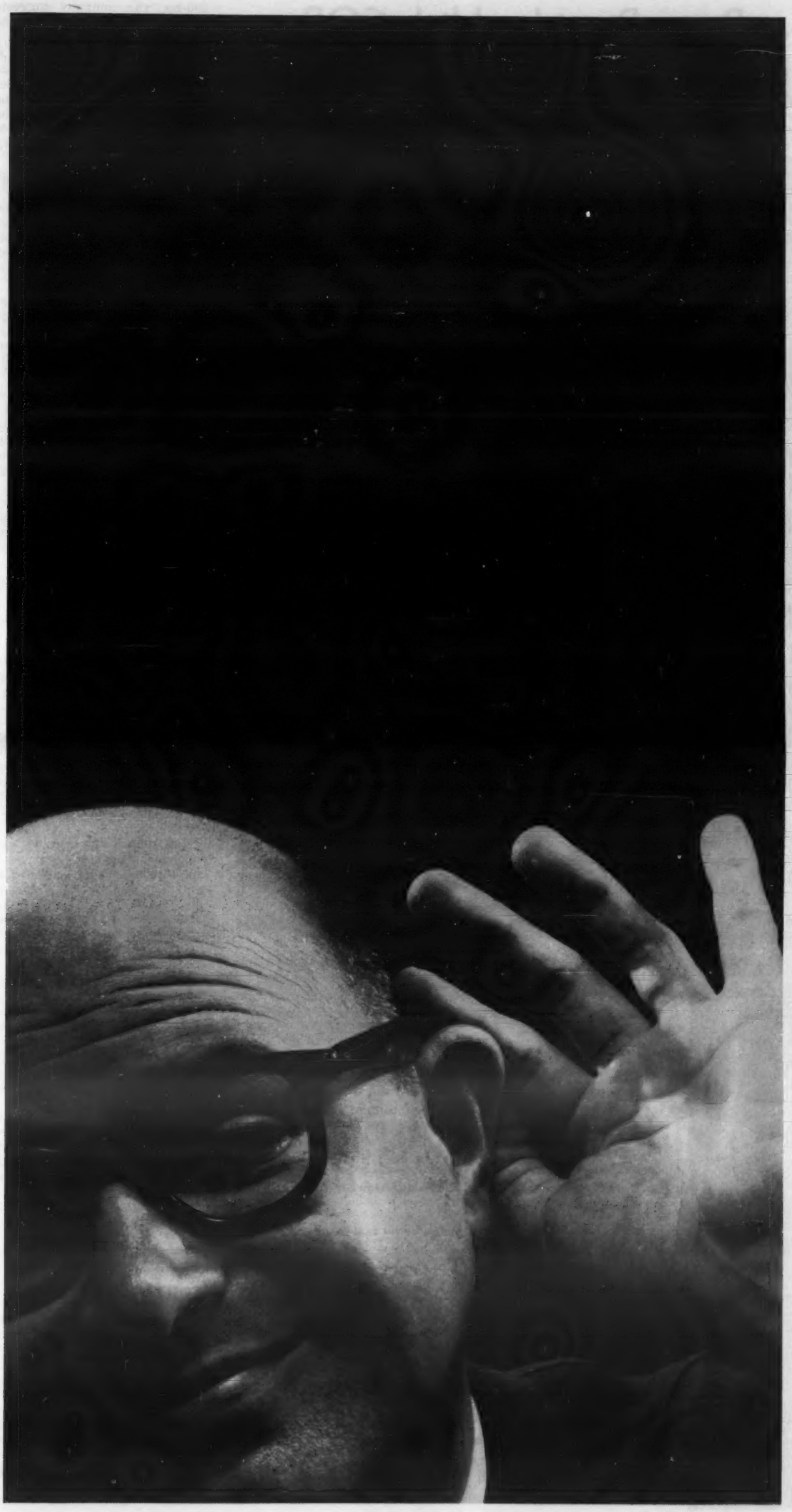
Ramsdell also pointed out that the air handlers are available in both vertical (WTE48-AC) and horizontal (WTE48-BH) models, and feature belt-driven, adjustable-speed blowers with permanently lubricated ball bearings, and operate on both 115 and 230 volts for ease of application. They are designed for installation in both residential and commercial applications.

Ramsdell said the new Weathertron "now makes our heat pump line one of the most complete offered by any manufacturer.

Du Pont TV Commercial To Feature Heat Pump

WILMINGTON, Del. — Heat pumps will be the subject of a three-minute commercial to be presented on one of this fall's "Du Pont Show of the Month" television programs, according to Frank R. Zumbro, director of public relations for E. I. du Pont de Nemours & Co., Inc. Date for use of the "spot" has not been announced.

Camera and television techniques are used to explain reverse cycle operation—heating-cooling through the use of "Freon" refrigerants.

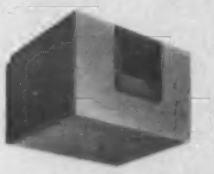


STAY TUNED TO GENERAL ELECTRIC FOR THE LATEST IN HEAT PUMP DEVELOPMENTS

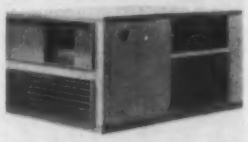
In 1932, General Electric pioneered the heat pump and has been in the forefront of its development ever since. General Electric has the greatest experience in this new field. There are more General Electric Weathertrons installed in homes, stores, offices and small plants than any other heat pump. When new developments in this field are made, you will be sure to find them in the G-E Weathertron All-Electric Heat Pump.

TWO TYPES OF WEATHERTRON AVAILABLE

1. Split (two-piece) system—weather-resistant remote outdoor unit and an air handling unit (shown), which can be floor- or ceiling-mounted. 2½, 3, 4 and 5 tons.



2. Integral system—compact and complete in a single, attractive, weatherized package. Installs through exterior wall, or entirely outdoors. 2½ and 3 tons.



General Electric will sell Weathertron only in areas where it is right for the customer.

WEATHERTRON
ALL-ELECTRIC HEAT PUMP

GENERAL ELECTRIC
Air Conditioning Dept., Tyler, Texas

Water-Source Heat Pump Provides High COP

But Problems of Water Supply, Quality, Waste, and Temperature Limit Application

CHATTANOOGA, Tenn.— Water-source heat pumps first captured the interest of the Tennessee Valley Authority in 1947—a time "when many thought the air-source heat pump would never be practical," states Buford Martin, Research and Demonstration Branch, TVA. The heat sources for the water-type heat pumps were wells, lakes, and streams.

"However, in many of the communities in which we are interested there exists a heavy underlay of stone which makes it very difficult and expensive to provide wells of suitable depth to obtain the necessary amount of water for satisfactory operation," Martin continues, thus pointing up one of the major reasons that water-source heat pumps, admittedly the most efficient, will not reach the distribution and general acceptance of air-source units.

Another practical problem which has shown up: well water, if too much is returned from the unit, will change in temperature to such an extent that the source becomes no longer suitable for heating in winter or cooling in summer.

Coefficients of Performance as high as 4.5 have been found on some water-source heat pumps, according to Jack R. Taylor, Hq. Strategis Air Command. This COP is entirely feasible with warm water sources as wells and generator cooling water at hydroelectric plants.

"Such a system will also maintain near constant output with varying outdoor temperature and heating loads—so long as water temperatures of the heat source and heat rejection temperatures do not vary," Taylor stated.

The water problem—supply, waste, and quality—is the stumbling block for water-source heat pumps. In specific instances, the problem can be solved. In small home installations, for example, the McMillan Co., Jacksonville, Fla., advocates the water used in the heat pump be returned to the earth by lawn sprinkling. In larger installations, 10 through 300-hp., the company suggests the water be returned to the earth through a drain well.

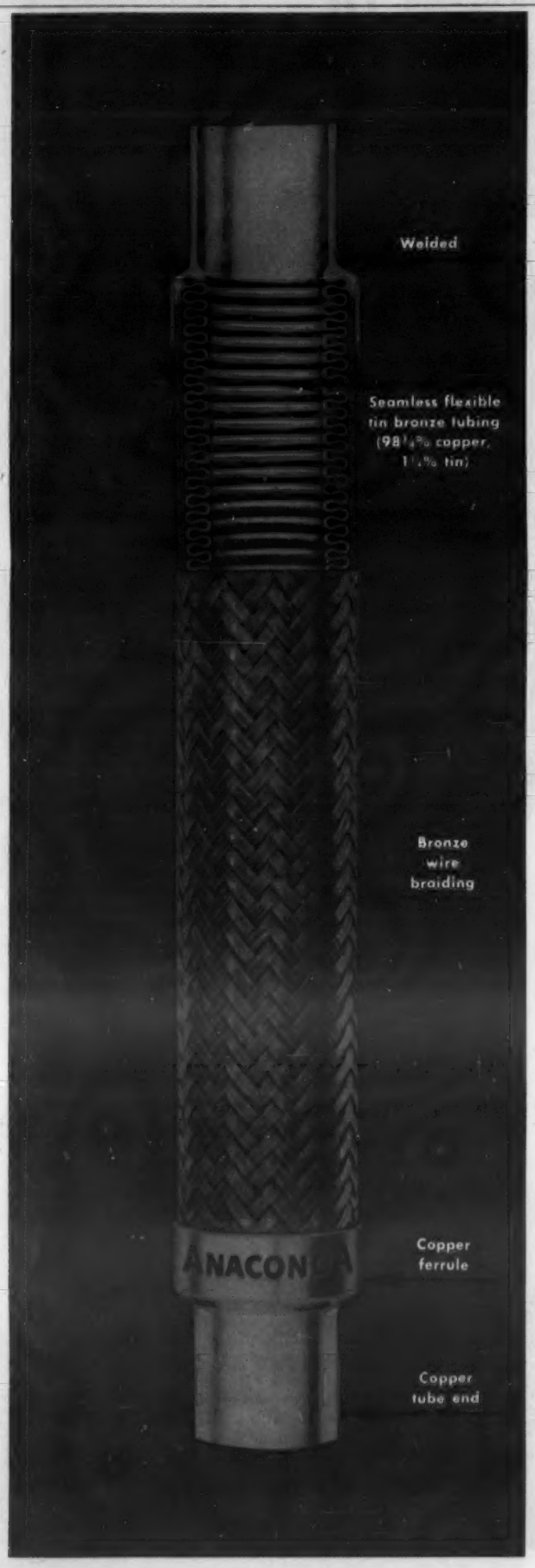
"In areas where water is available, we have figures to show that it is far cheaper over-all for a customer to spend as much as $500 for a well and pump than to use a waterless heat pump," states W. W. McMillan, president.

"On large commercial installations, operating costs over a period of time have proved that the purchaser can afford to invest up to $90 per horsepower for well and pump equipment and still show a saving over waterless heat pumps."

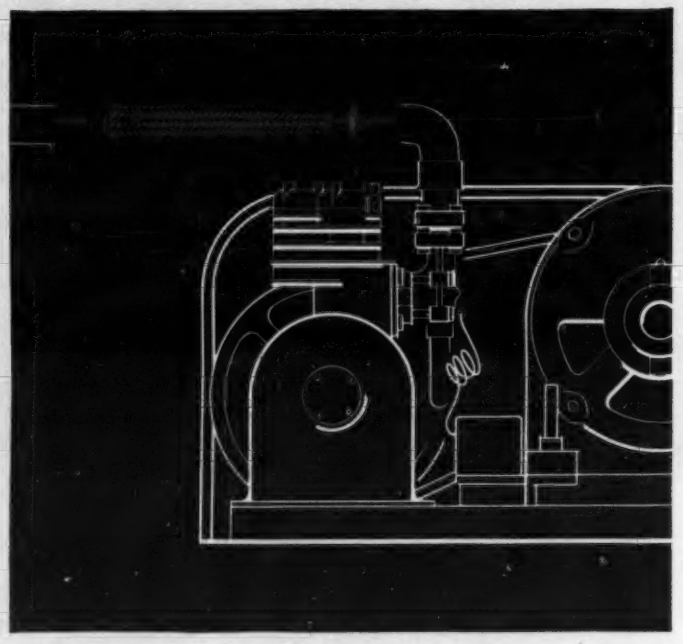
Companies which produce water-source heat pumps have developed easily cleaned coils to ease the problem of scale and corrosion where water quality is not high.

Very few water-source heat pumps ever need supplemental resistance heat, a fact which accounts for successful application of these units in colder areas where air-source units may operate at high costs.

Nevertheless, it is the feeling in the industry that the water-source heat pump will not achieve the widespread acceptance of the air-source unit.



DAMPING LINE VIBRATION FOR LASTING SYSTEM PERFORMANCE



The right application. Tailored for the refrigeration and air conditioning industries, Anaconda Vibration Eliminators are designed to absorb vibration in rigid tubing, as indicated above. Anaconda VE's prevent cracking of rigid lines, loss of expensive refrigerant, down time and high maintenance costs.

The right materials and construction. The special tin bronze used in Anaconda Vibration Eliminators is the alloy that best withstands fatigue under vibration. This, and the skill and know-how involved in forming the corrugations and completing the assembly, provide long, dependable performance.

The right packaging. Anaconda VE's are cleaned, pressure-tested, oven-dried, inspected, and sealed in vaporproof polyethylene bags. They are then packaged in strong, compact boxes that are easy to open, easy to identify.

Marked with a name your customers know and respect. Each VE is stamped with the name Anaconda as shown at the left. This tells your customers you are using quality equipment in your systems.

Anaconda Vibration Eliminators—listed by Underwriters' Laboratories through sizes 3⅝" O.D.—are sold by leading air conditioning and refrigeration wholesale distributors everywhere. For descriptive folder, write: Anaconda Metal Hose Division, The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 59180

ANACONDA®
VIBRATION ELIMINATORS

Union Did Not Induce Boycott, NLRB Rules

WASHINGTON, D. C. — National Labor Relations Board has affirmed a trial examiner's recommended decision that neither Sheet Metal Workers Local 49, Albuquerque, N. M., nor its business agent had induced or encouraged employes of a contractor to refuse to install air conditioning ductwork fabricated by another struck contractor.

The union was charged with secondary boycott because a union member refused to install the "struck" ductwork. Charge was brought by Driver-Miller Plumbing & Heating Corp., mechanical contractor constructing an air conditioned bowling alley in Albuquerque.

Anderson Sheet Metal Co. held a subcontract to fabricate and install ductwork. Before Anderson could install it, his firm was struck. Completion of the job was given to Garcia Sheet Metal Co. An employe of Garcia refused to handle Anderson's ductwork.

NLRB decided that the union business agent had not induced the employe to refuse to handle the ductwork even though the agent upheld the member's stand.

For more details see June 22 issue of the NEWS, page 2.

Home Improvement Show Set for Chicago, Feb. 5-7

NEW YORK CITY—The 1960 Home Improvement Products Show and convection will be held on Feb. 5-7, 1960, at the Navy Pier in Chicago, it was announced here.

Advance registration may be made by writing to the Home Improvement Products Show, 331 Madison Ave., New York 17, N. Y. Admission badges are mailed in advance. There is no registration fee for the exhibits.

Westinghouse q|s|p* Heat Pumps

*quality-service-performance

...provide comfort for mammoth housing project

Eight hundred and four Westinghouse heat pumps heat and cool the modern, 14-million-dollar housing project for Air Force personnel at Myrtle Beach, S.C. Central-system Westinghouse units comprise one of the largest residential installations in the country and assure year-round pleasant home temperatures with a single setting of the thermostat.

...control the climate in a major terminal

Allied Van Lines' new Southwest Terminal—the world's first Total Electric van-service terminal—uses quiet, efficient Westinghouse heat pumps for zone heating and cooling of its 7842 square feet of space. Made up of crew quarters, office space and storage space, each portion of the terminal receives precise, automatic comfort with Westinghouse heat pumps day and night, in every season.

These applications typify the broad range of products and demonstrate **quality-service-performance** in action. Here's what it can mean to you.

Quality—in products . . . in the caliber of people with whom you deal . . . in the job performed by Westinghouse contractors installing and servicing equipment.

Service of the whole Westinghouse organization in helping contractors sell more efficiently and profitably . . . customer service . . . replacement service . . . and many others.

Performance of products in use . . . of people who are vitally interested in your needs and in your customers . . . of a modern, complete air conditioning plant manned by experienced workers . . . and performance of a full range of packaged and field-assembled equipment for all three markets—residential, commercial and industrial.

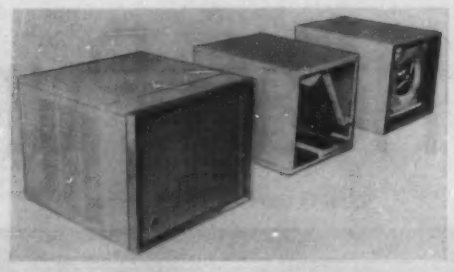
Westinghouse q|s|p has real meaning for contractors, specifiers and users.

On your next air conditioning or heating requirement, better call Westinghouse. J-65026

AIR CONDITIONING DIVISION,
WESTINGHOUSE ELECTRIC CORPORATION,
STAUNTON, VIRGINIA

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS



PERFECTION INDUSTRIES' new "Tri-Pak" remote heat pump includes (l. to r.) condensing unit, indoor coil, and blower section.

Tri-Pak Heat Pump Offers Eight Patterns Without Cutting, Fitting

CLEVELAND — Perfection Industries, Div. of Hupp Corp., announced that its new "Tri-Pak" heat pump has been introduced nationally "after exhaustive field tests following extensive market research."

Versatility of the air-cooled unit was stressed.

"The Tri-Pak's adaptability," the company said, "stems from its three-part design: a remote condenser goes outside the house while the indoor coil and air handler can be squeezed up under the eaves, in a utility closet, or, if space is really tight, can even be left outside in the breezeway. The Tri-Pak will install under a monitor roof only 3 ft. high.

"The Tri-Pak coil and air handler can be combined into eight different arrangements—four for low silhouette with horizontal airflow, four compactly stacked for vertical air flow—without any cutting or fitting of the parts as delivered. All duct openings are pre-cut in the factory. With minor adjustment 16 other installation patterns are possible."

Fully automatic, the Tri-Pak heat pump comes complete with thermostat.

"Factory tested and capacity guaranteed, the Tri-Pak refrigeration system is covered by a five-year warranty," it was noted.

"The capacity of the Tri-Pak is big enough for small commercial installations as well as homes. The model 30HS provides a cooling capacity of 37,000 B.t.u. and a heating capacity of 38,800 B.t.u. Accessory heating capacity of 12 kilowatts is available."

Air Force Speaks Up on Heat Pumps

DAYTON—A capsule summary of Air Force opinion on heat pumps is provided by these comments from a talk given by J. R. Taylor, Strategic Air Command, at the recent Air Force Conference on Refrigeration and Air Conditioning.

"Rain dripping from an overhang and filling a fan well is a minor problem ordinarily. But when it occurs in hundreds of identically installed units, we have an epidemic—but one due to misapplication, not to poor quality units."

"Our experience has shown that electrical demand when heat pumps are installed should be taken at double what the demand would be for cooling alone. And let's not use a so-called diversity factor; when it is cold, it is cold for everyone and all the units will be on."

"Except in unusual circumstances, we will not consider the use of heat pumps where design temperature is below zero or where the maximum heating-to-cooling ratio is over 1.5." (As a point of reference, Taylor cited the 0.2-0.3 heating-to-cooling ratio in a structure containing electronic equipment.)

"There is definite need for a temperature limiting device to prevent the use of resistance heat above, says 40°."

"The one questionable area to which we must face up is maintenance over the long pull. By this I mean over a period of 5, 10, 20 years. Actual cost data is not yet available, and we may expect to wait some time for it."

CITIES SERVICE OIL COMPANY — ROMA WINE COMPANY — ALLEN B. DUMONT LABORATORIES, INC. — AMERICAN AIRLINES, INC. — GENERAL SERVICES ADMINISTRATION — J. M. FIELDS STORES — U. S. ARMY — FROZEN RITE, INC. — PACIFIC TELEPHONE & TELEGRAPH COMPANY — TEXAS FASTENER CORPORATION — RONEY PLAZA HOTEL — UNIVERSITY OF SOUTHERN CALIFORNIA — PHILLIPS PETROLEUM COMPANY — CHICAGO BRIDGE & IRON — GENERAL ELECTRIC — ATLANTIC & PACIFIC TEA COMPANY — ROBERT HALL CLOTHIERS — HUMBLE OIL COMPANY — OLIN MATHEISON — LOCKHEED AIRCRAFT AREOJET — SYLVANIA ELECTRIC — F. W. WOOLWORTH COMPANY — KAISER ENGINEERING CORPORATION — U.S. NAVY SAFEWAY STORES — CONVAIR — ATOMIC ENERGY COMMISSION — CONTINENTAL BAKING COMPANY — REPUBLIC AVIATION — FOOD FAIR STORES — NATIONAL CASH REGISTER — BURROUGHS CORPORATION — FEDERAL HOUSING ADMINISTRATION — EDISON COMPANY — RAND McNALLY & COMPANY — MINNESOTA MINING & MANUFACTURING BANK OF AMERICA — U.S. AIR FORCE — NEW YORK — MPANY — FRANKLIN STORES — NATIONAL FOOD STORES — CENTRAL CASUALTY INSURANCE COMPA — C COMPANY — PACIFIC GAS & ELECTRIC — RADIO CORPORATION OF A — KY LAGER BREWING GENERAL — T STORES SEARS & — STATE FARM INS — MUZAK CORPORA — PORATION BOND STO — NSURANCE COMPANY — REFINING COMPANY — COMPANY NEW ENGLAND TELEP — LONIAL STORES, INC. GLENN MANUFACTURING COMPANY — CURTIS WR — EL MUNDO, INC. — U. S. PLYWOOD — FORD MOTOR COMPANY OF CANADA, LTD. — DIPLOMAT HO — ILD CAMERA & INSTRUMENT COMPANY — AMERICAN THERMOS PRODUCTS — PACIFIC MURPHY MANUFACTURING CORPORATION — THE MAYTAG COMPANY — INTERNATIONAL BUSINESS MACHINES — NATIONAL BISCUIT COMPANY — ASIATIC PETROLEUM CORPORATION — INSULAR CHEMICAL COMPANY STANDARD LIFE & ACCIDENT COMPANY — EASTMAN KODAK COMPANY — UNIVERSITY OF OKLAHOMA — BELL AIRCRAFT MONARCH METALS WEATHERSTRIP COMPANY — McDONNELL AIRCRAFT CORPORATION — BETHLEHEM STEEL COMPANY — B-THRIFTY STORES, INC. — WAYNE PUMP COMPANY — ARMA CORPORATION — THREAD, INC. — AMERICAN OIL COMPANY TRANSCON FREIGHT LINES — AMERICAN CAN COMPANY — KANSAS CITY FIRE AND MARINE INSURANCE COMPANY — T G & Y STORES — BRITISH OVERSEAS AIRWAYS CORPORATION — RAND McNALLY & COMPANY — NEW YORK TELEPHONE COMPANY WESTERN ELECTRIC COMANY — AMERICAN MACHINE & FOUNDRY — W. T. GRANT COMPANY — PIGGLY-WIGGLY FOOD STORES J. C. PENNEY COMPANY — PENN FRUIT STORES — RUTGERS UNIVERSITY — U. S. MARINE CORPS — HOWARD JOHNSON'S KROGER COMPANY — CIVIL AERONAUTICS ADMINISTRATION — E. I. DuPONT De NEMOURS & COMPANY — SAHARA HOTEL

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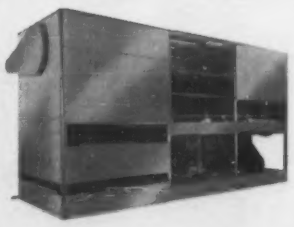

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4840 N. SEWELL • OKLAHOMA CITY

You Asked About It

Q. All I know about heat pumps is their name. What literature is available giving the fundamentals and the history of heat pumps?

J.A.I. — Cleveland

A. Start with this issue.

Actually, almost every text on refrigeration and air conditioning devotes at least one chapter to the heat pump. One of the latest and most effective of such chapters will be found in W. F. Stoecker's "Refrigeration and Air Conditioning," McGraw-Hill, 1958.

A more complete, though older treatment is given in "Heat Pump Applications" by Kemler and Oglesby, Jr.—also McGraw-Hill.

You can get a good start on understanding heat pumps by reading the pertinent chapters in the latest editions of the ASRE Data Book and the ASHRAE Guide.

Bibliographies offered in all these suggested readings will direct you to whatever further information you desire or need.

Bureau of Mines Tests Heat Pump In West Virginia

MOUNT HOPE, W. Va.—The ultra-modern Bureau of Mines building here contains the first two-stage air-source heat pump system in West Virginia. Four Worthington compressors provide close to 100 tons of cooling and 1,100,000 B.t.u. of heating for the edifice.

Installed by Summersville Heating & Plumbing Co., the air-to-water Worthington heat pump will act as a test system for the Bureau of Mines in Washington, D. C. The bureau has made tentative plans to test the performance of the system and publish the results for government and industry use.

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More Authentic Operating Cost Data Needed

DETROIT—"The weakest link in our promotional efforts on heat pumps is our obscure talk about operating costs," insists a Midwest distributor who has sold quite a few heat pumps. "I suspect, too, that this same factor may be an important source of adverse reaction by users," he holds.

His "weakest link" theory is supported by many in the industry who feel that "we are not giving prospective users a true picture of what I like to call *owning costs*—the total cost of a year of having one of these things in his home."

Operating cost estimates are published by manufacturers, utilities, dealers. Except when they are backed by meter readings and rate structures, the information is frequently quite confusing to the general, even to the more knowledgeable reader.

For one thing, costs are presented in so many ways: per ton . . . per horsepower . . . per square foot . . . per cubic foot . . . per "typical" house of so many square or cubic feet . . . per month . . . per day . . . per B.t.u.

On major heat pump producer states unequivocally, "We have reached the point where sales will depend in large part on realistic estimates of operating costs for specific installations. The problem is more complex when supplemental resistance heat must be included in the calculations."

3-Story Office Building Gets 78-Ton Heat Pump

ST. LOUIS—A 78-ton Carrier air-source heat pump provides heating and cooling for the three-story office building here of the St. Louis Shipbuilding Co. Although the building sits on the banks of the Mississippi River, river water was never considered at a heat source. Reasons: too dirty, extreme variations in water temperature and water level.

Silvercraft Auctions Machinery, Inventory

LOUISVILLE, Ky. — Equipment, machinery, inventory, and fixtures of Silvercraft, Inc., manufacturer of aluminum cooling towers and acoustical phone booths, were put up for sale at public auction on Sept. 14 after directors voted to dissolve the company as of Sept. 1, the firm announced.

It was also announced that Eugene Tucker, president of Metals Service Co., Louisville, has bought the patents and patterns and will continue to manufacture cooling towers.

During Silvercraft's six-year existence, Frank C. Lewis of Louisville served as its president.

"The steel strike combined with a lack of business brought about the dissolution of the company," the firm said.

Westinghouse Fall Training Program Will Include Heat Pump Servicing

STAUNTON, Va. — Fall factory service training program of the Westinghouse Electric Corp. Air Conditioning Div. will include a special series of basic heat pump and electric heating schools.

The primary courses have been designed for service personnel with limited backgrounds in the techniques of proper application, installation, operation and maintenance of both these product lines. Advanced service training on heat pumps will be included in the continuing fall program.

These special courses are designed to back up the division's expanded heat pump sales objectives, stated C. E. Cannon, manager of training. "One of the major considerations in appointing new outlets for sales and service of Westinghouse heat pumps is that the distributor has a well-trained service organization," Cannon stated.

Courses are under the direction of J. M. Nygaard, who has been responsible for the development of the division's service training efforts. Additional instruction is provided by members of the engineering department, product application section, and the product service department. Students enroll for a period of one week, with mornings devoted to classroom instruction, and the afternoons reserved for shop work, with students getting the opportunity to practice on equipment.

Typical Breakdown of Installed Cost of Heat Pump by Geographical Area

	SOUTHEAST					
Unit	77%	50%	50%	57%	42%	60%
Ductwork	23%	23%	30%	14%	33%	20%
Electrical	....	15%	20%	7%	....	10%
Labor	....	10%	....	22%	25%	10%
	SOUTHWEST & WEST					
Unit	50%	40%	50%	50%	60%	....
Ductwork	40%	15%	20%	25%	25%	....
Electrical	5%	15%	6%	8%	15%	....
Labor	5%	30%	24%	17%	....	....
	MIDWEST					
Unit	60%	70%	65%	50%	....	....
Ductwork	20%	20%	15%	30%	....	....
Electrical	5%	10%	5%	10%	....	....
Labor	15%	....	15%	10%	....	....
	EAST					
Unit	45%	50%	50%	....	....	....
Ductwork	25%	20%	20%	....	....	....
Electrical	5%	10%	10%	....	....	....
Labor	25%	20%	10%	....	....	....

10% Water Supply.

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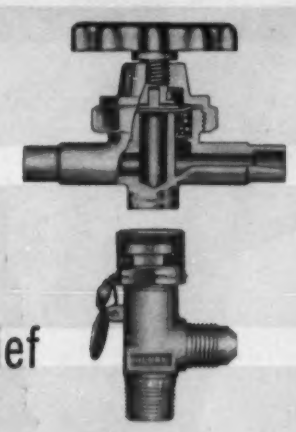
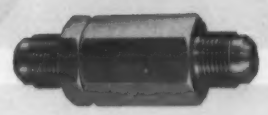


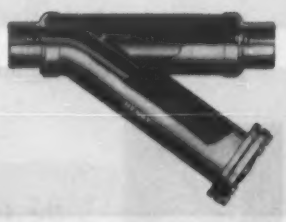
VALVES—Shut-off
Packless, Packed and Wing Cap Types

VALVES—Pressure Relief
Piston and Diaphragm Types



VALVES—Flow Check
Spring Loaded and Free Floating Types

FILTER-DRIERS & Driers
Sealed and Cartridge Types



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For Refrigeration, Air Conditioning and Industrial Applications
MELROSE PARK, ILLINOIS, U.S.A. CABLE: HEVALCO, MELROSE PARK, ILL.

Inside Dope

By GEORGE F. TAUBENECK

(Concluded from Page 1, Col. 1)

over the long distance telephone.

Yet, *lack* of information has been holding back progress of reverse-cycle refrigeration.

Literally, "the right hand knoweth not what the left hand doeth."

There's been too much secrecy among firms *(and inside manufacturing organizations)* engaged in the heat pump business.

Hence, the same mistakes are compounded and confounded.

As many as 21 different heat pump designs—each incorporating the same basic errors—have been on the market at the same time.

Salespeople and engineers *in the same company* often tell totally different stories, and neither group seems aware that it is contradicting the other.

Honest differences of policy on reverse cycle refrigeration application and promotion by public utilities are understandable. They're based on differing climates, load factors, and economic justifications. Utilities are INFORMED, much of the time, on their own situations.

Quite a few manufacturing and distributing organizations, however, seem to be shooting from the hip. The fast draw is nullified by blind aim.

Control manufacturers—particularly Ranco—are well informed about reverse cycle technique, but they're in the minority.

The "right to know," in too many cases, seems to have been supplanted by a refusal to learn.

Here's hoping that this special issue of the NEWS not only opens Pandora's Box, but also will open the door to knowledge which necessarily precedes progress.

Out of Our Mailbag

Mechanical Contractors Association of America
New York, N. Y.

Editor:

I read your column as soon as the NEWS comes into the office. Being a secretary, I particularly enjoyed the item in your "Inside Dope" on words typed exclusively with the left or right hand.

I have drawn up a list of all the words I could think of, and your executive secretary was certainly right. A secretary's left hand is very much overworked as compared to the right. I could only think of five frequently used words typed exclusively with the right hand as opposed to over 50 with the left hand.

The five are: opinion, monopoly, unhook, lollipop and uphill.

Here's my list of words typed exclusively with the left hand: average, attracted, abstract, affable, access, caster, craved, cadaver, cabled, carved, crevasse, reversal, reserved, retarded, baggage, barrage, better, braced, faster, grafts, streets, sweetest, detest, treated, tread, veneer, defeat, sacred, attest, agreed, federate, revealed, weaved, addressed, adverse, scarce, secret, extracted, steerage, sedate, dated, serves, server, staggered, starter, steadfast, ragged, reader, reassert, redress, excavate, crafts, freeze, agreed, creased, etc.

I could go on naming more, but my left hand is tired from typing the lefthanded list. Maybe one of the typewriter companies will come up with a more evenly balanced keyboard layout if we secretaries start complaining about left-hand-itis.

SAUNDRA LANG

---

602 South 57th Street
Omaha, Neb.

Editor:

I noted in your column a small article about a secretary who stated her left hand typed more words with the entire use of the left hand than the right hand and she could find only three words typed exclusively with the right hand.

I am able to add a word to the score for the right hand. That one word is "opinion," and it is a powerful word in itself.

PAULINE K. BYERS

Minneapolis-Honeywell Regulator Co.
Kansas City, Mo.

Editor:

I was amused at the article "Attention, Secretaries!" I am just a secretary, not an expert touch typist.

However, I cannot agree with the secretary who claims the left hand outworks the right. On an electric typewriter the right hand is responsible for both carriage return and tabular key. On either electric or manual typewriter the right hand is always responsible for the space bar.

Also, I have found just a few more words the secretary may add to her list of "right hand exclusives." These consist of at least six letters. unlink, polonium, opinion, pompom, poplin, hookup, pillion, plumply.

SHIRLEY J. HARRIS
Residential Controls Div.

David T. Applebee & Co
Grand Rapids, Mich.

Editor:

Here's another secretary who agrees that the left hand far outworks the right while typing. However, there are more than three words typed exclusively with the right hand. I thought you'd like to know some more, so here they are:

mullion
munnion
nonunion or non-union
monopoly
minium
minion
minikin
illinium (an element)
unlink or un-link

Granted, not all of these are common words! I'm sure there are many others, though, and I'd be interested to see them printed.

(MRS.) MYRTLE MCLAIN

Pendergraph-Jackson & Associates
Contractors and Wholesalers
Atlanta, Georgia

Editor:

If you have a reprint of your article about your wonderful Pierre-the-Bear dog please send it to me. Thanks.

H. A. PENDERGRAPH

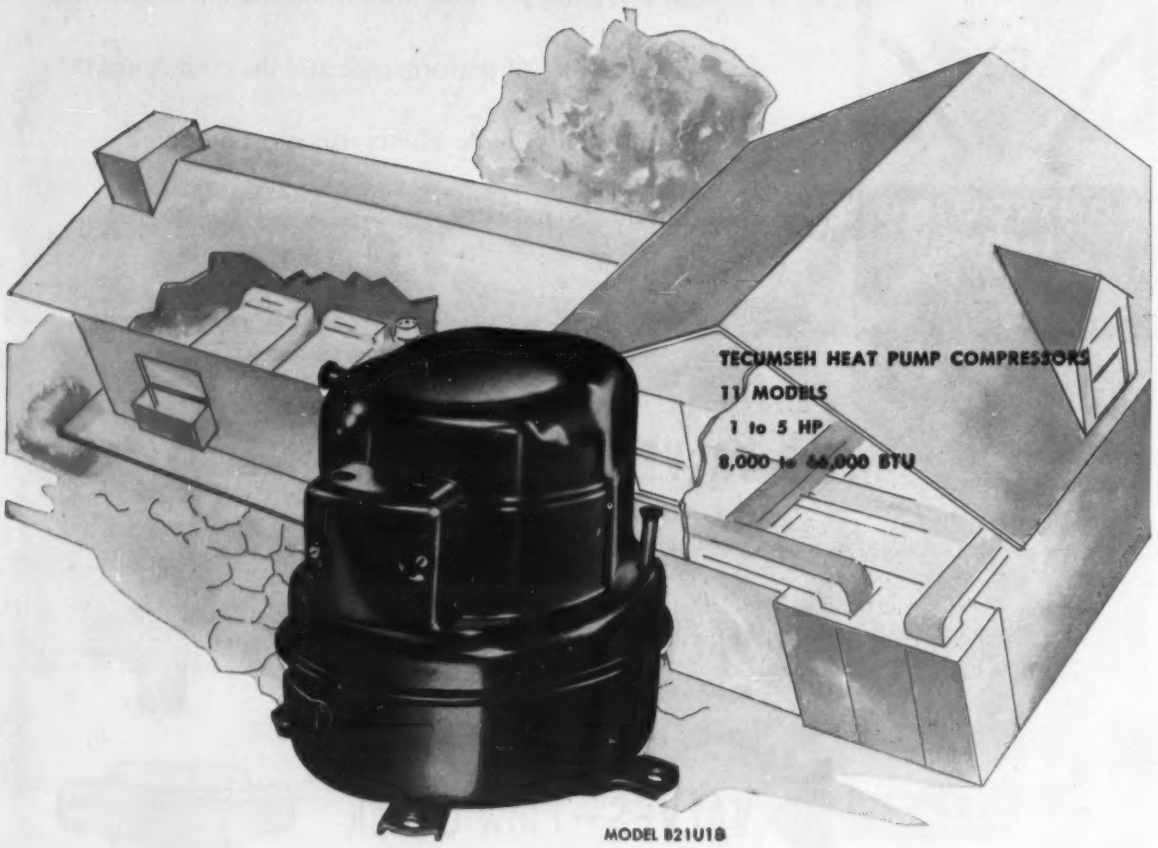
Redland, Calif.

Editor:

Your insight into the Russia-China situation I thought the best editorial writing I ever have read. For my money "Inside Dope" deserves a raise in pay.

R. A. NICHOLS

JOB DESIGNED
TO 'STAY ON THE LINE'



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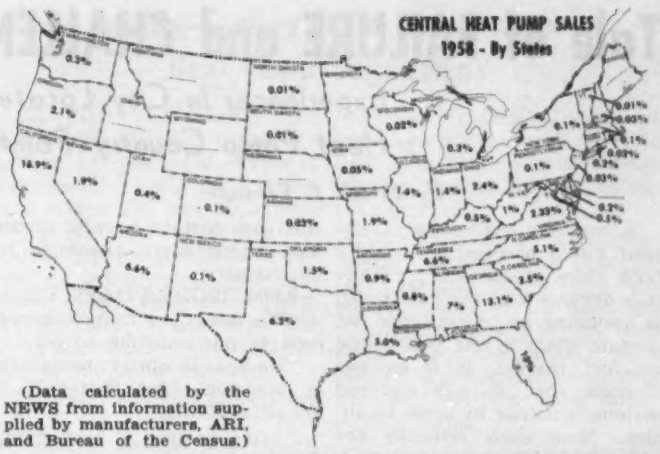
FLORIDA—The Happy Heat Pump State

64% of All Air Conditioning Sold In This State Is Going Heat Pump—Some Distributors See 90% In Fall



(Data calculated by the NEWS from information supplied by manufacturers, ARI, and Bureau of the Census.)

FLORIDA — By 1962, the southern part of Florida will have 160,000 room unit heat pumps and 50,000 central units.

Approximately 30% of all central heat pumps now installed in the United States are in this one state. The proportion of room units is even higher.

Sixty-four per cent of all air conditioning sold is going heat pump; some distributors report this figure goes as high as 90% in the fall. Heat pumps are provided as a matter of course by many builders of medium and low-priced housing.

Florida is the center of conversion activity — the changing of cooling units to heat pumps —and is host to several companies who produce and sell their heat pumps chiefly in the state.

From all this it follows that Florida has a lot to say to the heat pump industry and, indeed, much of the present state of the art is due to Floridian experience. In some instances, however, conditions and problems in Florida are unique and without applicability to other geographical areas.

For example, it becomes readily apparent when discussing heat pumps with Floridian distributors, utilities, consumers that they have no conception of the magnitude of northern problems with supplemental heat, defrost, operating cost.

Especially in southern Florida, south of Palm Beach, say, resistance heat to supplement the compressor cycle is very rare. Until the "bad" winter of 1957-'58, this area had never experienced any defrost problems.

Where operating costs have soured many northern users of the heat pump, this complaint is almost never heard here. Some of the reasons:

Hold a 72° room during heating and a 78° room during cooling season, typical annual operating costs for a 2-ton heat pump is an 800-sq. ft. house are $87 for cooling, $12 for heating.

A 3-ton heat pump will cool a 1,200-sq. ft. house for $130 a year; heat it for $18.

In a 2,000-sq. ft. house, a 5-ton unit cools for $217, heats for $30.

On window units:

¾-ton—$34 cooling, $4 heating,
1 -ton—$52 cooling, $6 heating,
1½-ton—$66 and $7,
2½-ton—$96 and $9.

All these figures at an electric rate of 1.8 cents per kwh.

Data obtained from metered installations show that operating costs on cooling change 5-8% for every degree change in inside design temperature; heat cost at 75° is double what it is when the room is held at 70°.

The increasing use of heat pumps in housing developments has not been an unmixed blessing for Florida electrical utilities.

Figures like thouse above apply when the units are used year around—coming on automatically, say, as heating and cooling are needed. Experience has shown, however, that people in lower-priced housing—and to a degree in medium-priced housing—will use the heat pump fully during the heating season, but only partly or not at all during the cooling season.

Since in Florida the cooling season is by far the longer, this erratic usage forces the electrical utilities to supply full capacity for winter, but the capacity is not used in summer, resulting in a poor load factor. Because of the tourist trade, most Florida utilities experience a winter peak, and it is traditional that utilities with *summer* peaks are the most aggressive promoters of heat pumps.

Room units are highly favored in Florida, although Florida Power Corp., St. Petersburg, has detected a definite increase in the ratio of central-to-room installations.

Hotels, apartments, even large stores use room units because of the flexibility they render in zone cooling and heating. Many such users repeat the familiar argument, "When a room unit fails, only one room suffers; when a central system goes—" Also, total operating cost is lower with room units than with a central system, they point out.

Because of the difficulty—some say impossibility—of adding ductwork to an existing Florida home, room units are used extensively in older houses. In new construction, attic mounted self-contained equipment is popular, as are split units with the blower coil in the attic.

User opinion of equipment is high, with dissatisfaction being primarily of the nuisance type.

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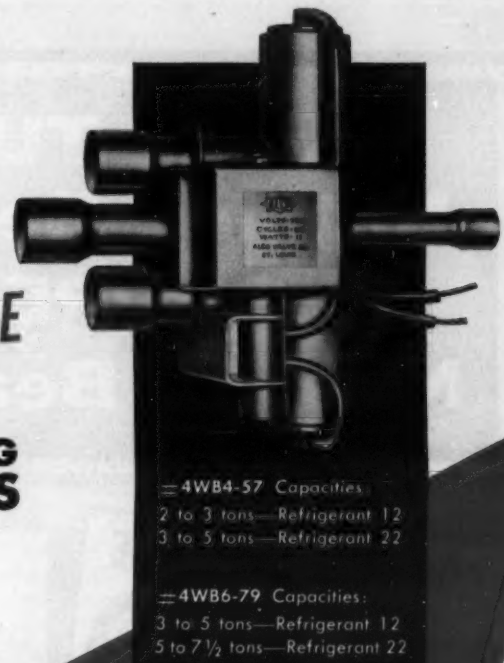

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4WB6-79 Capacities:
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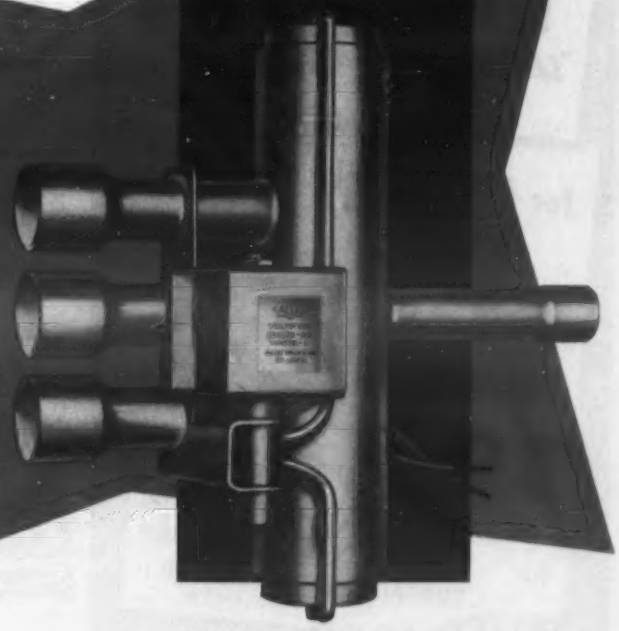

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Tale of FAILURE and CHALLENGE

Experiences In City Located Outside Normal Heat Pump Country Point Up Trouble Spots

By Frank J. Versagi

A realistic evaluation of the heat pump necessarily includes both sides of the story. While it is obvious that the heat pump is assuming an increasingly important place in the year-round comfort market, it is equally obvious that it has suffered serious setbacks in some localities. Most such setbacks are ultimately technical in nature—whether in the design, installation, or operational phase.

The city discussed in this article is typical of localities outside normal heat pump country; the problems experienced here have been experienced in enough similar cities to make this case history a valid profile and a legitimate challenge to the industry.

6,000 DEGREE DAYS, U.S.A.—"We have had four compressors in our machine so far."

"No heat in winter; no cooling in summer. Live Better Electrically? Bah!"

"After owning a heat pump for three years, at a tremendous cost in money, discomfort, and inconvenience, we feel we have earned the title of sucker."

"Perhaps I'd stick with the heat pump—if only the operating costs weren't so high. . . ."

These are users talking. Disappointed, disgruntled users, more typical than not of the 75 owners of residential heat pumps in this city. From the very beginning, things didn't go well here.

What Went Wrong With Installations?

For example: The NEWS received an announcement that two housing developments here were going all heat pump; the announcement implied that the installations were an accomplished fact. A visit revealed that in the first development the builder had placed a heat pump in the model home, $30,000 class. Numerous service problems and prohibitively high operating costs soured the builder, and the homes have gone to gas heating with add-on cooling.

In this single model home, troubles were experienced with compressor failures, defrost, slugging, resistance heat shorting out, and terminals arcing.

On another, smaller housing development, seven heat pumps were installed. Again excessive problems forced the builder to go to conventional heating and add-on cooling. Two of the units have been replaced with another brand. No results yet.

One man in the know told the NEWS that 80% of the heat pumps installed in the area are undersized. **"Not through miscalculation, but to get the sales,"** he insists. "The resulting high operating costs, voiced by the owner to his acquaintances, sours possible future users, even if the owner admits, as many do, that they like the heat pump performance, as such."

According to another source, "Time after time, a sales engineer will claim a 15° balance point, only to have the unit operate at a 25° balance point."

As in some other cities, the utility worked with manufacturers in promoting the sales of heat pumps, then found more and more of the service burden passed on to it by default.

User Threatened To Run Ad Telling of His Unfortunate Experiences

Asked by the NEWS if service was prompt and efficient, one user blared, "No, definitely not." Another: "Sometimes we waited three days for service last winter." Still another bluntly offered, "It is a sin and a disgrace the way we were handled by one of the biggest companies in this country." This party was threatening to publish an ad in the local paper telling of his heat pump experiences.

Separate metering on one unit has posed a problem. In April of this year, the unit showed 1,800 kwh. consumed by the compressor and 760 kwh. by resistance heat—this in a month when only a very few hours called for supplemental heat. According to a utility engineer, one of three things is wrong:

1. The compressor is overrated;
2. the heat loss of the house was miscalculated;
3. the defrost operation consumes more resistance heat than estimated.

At Present Rate of Consumption Heating Bill Would Hit $400

The engineer favors this last theory and feels further study may call for basic redesign at the factory. At the present rate of power consumption, the yearly heating bill would come to over $400 on this unit.

Average installed costs of heat pumps in this area are $700-$750 per ton for 3-ton units; $640 per ton for 5-ton units. Cost breakdown on a typical 3-ton installation is $1,550 equipment, warranty, and placement; $150 electrical; $500 ductwork and installation.

When a user insists on a self-contained unit in a basement, there is the added cost of an air well outside the house to provide adequate intake and discharge of air without short circuiting.

Insulation costs vary from a low of $150 to almost $400.

Even with insulation as recommended by the utility and distributor, operating costs in this city have been comparatively high. The electric heating rate is 1.65 cents per kwh. Typical figures: on a 5-ton heat pump, $500-$600 per heating season, $119 highest monthly bill; on a 3-ton, $220 with the highest monthly heating bill at $67; another 5-ton, $450 for the heating season, with a $90 high.

Many of the users are happy with the performance of the heat pump, when it is operating, with reference to the actual comfort it produces. Others complain that the house never gets warm enough during the season when heating is most needed.

Service problems definitely occur more frequently in winter than in summer, users agree, and service varies from extremely rapid and effective to very slow and ineffective.

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A line of heat transfer tubing made by Readi-Fin Mfg. Co., Inc. (a subsidiary of Reading Tube Corp., at Reading, Pa.). The extended surface is extruded from the tube wall, thus eliminating the possibility of fin failures resulting from thermal shock, corrosion and erosion. This "one-piece" (integral) construction provides maximum heat transfer efficiency, ruggedness, easy fabrication and freedom from fouling. It's available in Water Tube types with finned or plain ends and in Condenser Tube types with finned, plain or stripped ends.

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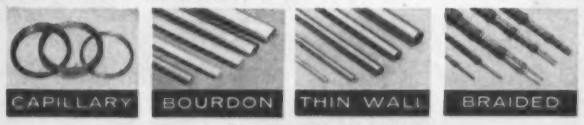

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DENVER, COLO. 2845 Walnut St.
CLEVELAND, OHIO 4615 Perkins Ave.
HOUSTON, TEXAS 1121 Rothwell St.
DALLAS, TEXAS—9000 Sovereign Row, Brook Hollow Industrial District

Summary of Data Gathered by Utility

Heating:

Average use for 6,000 degree-day season — 19,579 kwh.
Average cost for 6,000 degree-day season — $322.64
Average heating volume of house — 23,658 cu. ft.
Average cost per cu. ft. — 1.393 cents

Cooling

Average use for approximate season — 1,965 kwh.
Average cost for approximate season — $37.35
Average cooling volume of house — 23,069 cu. ft.
Average cost per ton of air conditioning — $10.04
(Measured data was extrapolated to season length.)

The NEWS knows of one distributor who set up a canvas tent around the outdoor section of a heat pump in -10° weather. He spent an entire night attempting to evacuate and recharge this system. The resistance heat in the plenum was not nearly enough to maintain comfort for the house occupants, however, and they showed no appreciation for his dedicated efforts.

A sore spot with users is the cost of service to them—even in warranty in some cases. There seems to be no rule which determines whether the dealer makes a charge for in warranty parts and service. Some users have had service and paid not a cent; some have spent about $40 per year of ownership; others average $100 per year on service costs.

"In spite of theoretical figures to the contrary, the cost to maintain a gas or oil furnace comes nowhere near these figures," is a typical complaint.

Owners, some utility personnel, some distributors are justifiably concerned about the role of the heat pump here. In one way or another they ask questions about product installation, merchandising practices, service, operating costs.

- **About the product:** Are heat pumps really ready for areas like this? Heat pump manufacturers, themselves, are divided into two camps on this point. Only four are aggressively seeking business in this city. Of the others, one has a manufacturing plant in this city and refuses to sell any of its units here.
- **About installation:** Heat pump manufacturers are unanimous in their statement that the equipment can be no better than its installation; installation, by definition, includes proper load calculation as well as mechanical placement of the equipment. "Yet," complains one source, "in their enthusiasm for sales, manufacturers are using distributors who know very little about heat pumps; in fact, I know that some distributors are being forced to install heat pumps against their better judgment." Plumbing concerns are being used as outlets by a few manufacturers.
- **About merchandising practices:** Here the largest complaint is overselling—a sales fault certainly not limited to heat pumps.
- **About service:** This city's experience with erratic service parallels that over most of the country—even in areas where the heat pumps are performing more than adequately. "Our industry feeling aside, the fact remains that people consider cooling a luxury; they are unhappy but not miserably so if the cooling unit breaks down. But heating is a necessity.

There is an admitted nationwide shortage of competent heat pump service personnel.

- **About operating costs:** This factor is, of course, tied in with the product's state of readiness. Experience in this city indicates that even the relatively reasonable rate of 1.65 cents per kwh. does not bring heating costs of present equipment to levels which allow users to make happy comparisons with fossil fuels. Supplemental resistance heat gets most of the blame.

This disappointed city certainly offers a challenge to heat pump manufacturers, their engineers, and salesmen.

Heating-Cooling Ratio Important In Heat Pump Calculations

DAYTON — "Probably the first qualifying point to investigate in determining the types of commercial buildings where heat pumps can best be applied is the heating-to-cooling ratio," stated William H. Devine, manager of refrigeration and heat pump sales, York Div., Borg-Warner Corp., at the recent Air Force Air Conditioning and Refrigeration Conference here.

"If the ratio of the heating load to the cooling load (both in B.t.u.h.) is less than 1.0, it is likely that a heat pump may be applied to the building with a resulting favorable operating cost."

The reason that the heating-to-cooling ratio is an important qualifying factor, according to Devine, is that the refrigeration equipment generally produces less capacity on heating cycle than on cooling cycle; therefore, a lower heating load favors the heat pump.

"Talking about heating-to-cooling ratios of less than 1.0 may surprise some," he admitted, "since in the past the heating load has generally been larger than the cooling load. Modern buildings are reversing this past pattern with larger cooling loads."

For Your Reprint Copy
"Emergency Diagnosis, Repair of Hermetic Unit Electric Components," by John L. Zant, mail this ad with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort, Detroit 26, Mich.
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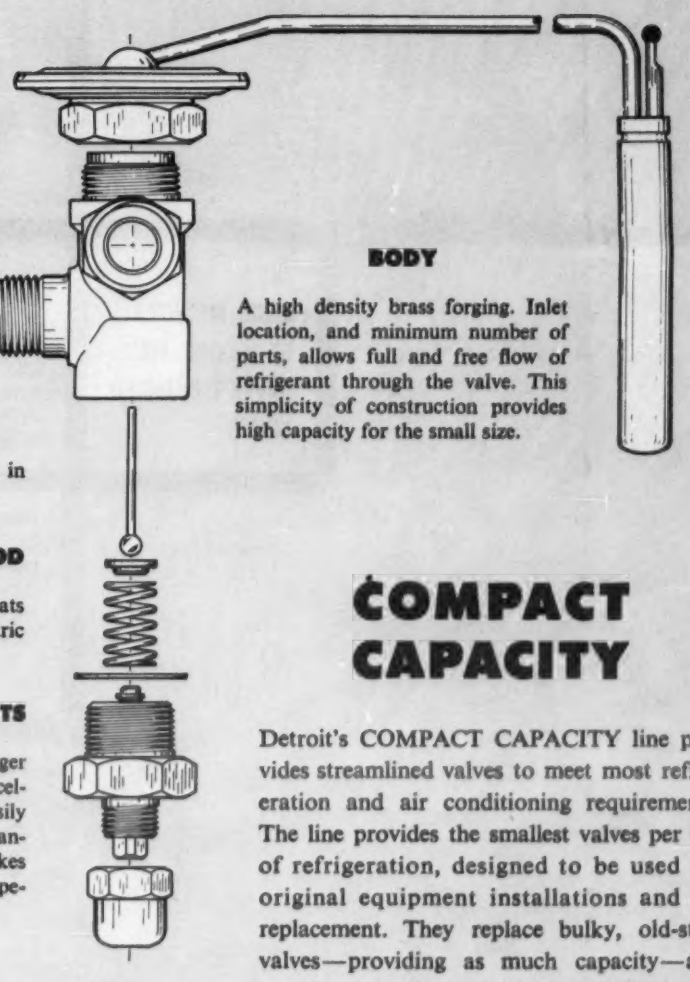

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The small removable stainless steel power element is shielded-arc welded by specially developed equipment. In this new design and method of assembly, full diaphragm flexibility is accomplished.

BODY

A high density brass forging. Inlet location, and minimum number of parts, allows full and free flow of refrigerant through the valve. This simplicity of construction provides high capacity for the small size.

LARGE INLET STRAINER

Easily removed for cleaning—held in position by a retainer clip.

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Self aligning and self centering—seats perfectly every time. Ball is concentric to push rod.

ONLY THREE MOVING PARTS

—for smoother operation and longer life. No clips, extra springs or miscellaneous parts. Detroit valves are easily disassembled for inspection and cleaning. Ready availability of parts makes field service possible when needed. Special tools are not required.

COMPACT CAPACITY

Detroit's COMPACT CAPACITY line provides streamlined valves to meet most refrigeration and air conditioning requirements. The line provides the smallest valves per ton of refrigeration, designed to be used for original equipment installations and for replacement. They replace bulky, old-style valves—providing as much capacity—and can be installed without repiping. *See the COMPACT CAPACITY line at your Detroit Wholesalers.* Ask him, too, to show you the new valves with built-in inspection windows. Do it—today!

The Detroit 718 is just 2¼" high. When the valve is installed as shown here, inlet is at bottom and outlet is to the side. This allows easy replacement of most valves without repiping.

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AMERICAN-Standard
DETROIT CONTROLS DIVISION

7,500 Central Heat Pumps Now On TVA Lines

CHATTANOOGA, Tenn.—There are approximately 7,500 central heat pumps on the lines of TVA's 99 municipal and 51 rural cooperative distributors of power, estimates Buford H. Martin, Research and Demonstration Branch of TVA. Of these, some 6,000 are residential applications.

Commercial installations include churches, banks, office buildings, restaurants.

"Air-to-air heat pumps are being very well accepted in the TVA area," Martin asserts. "While it is true that manufacturers have all experienced difficulties with defrosting, I feel most of the products now being installed solve this problem."

PORTLAND 'INTERESTED' In Heat Pump

Economy and Low Maintenance on Properly Installed Equipment Cited by Owners of Commercial Buildings

PORTLAND, Ore. — Owners of commercial buildings in this city have found the heat pump very economical, according to Bob Seaberg, air conditioning engineer of Portland General Electric Co., the utility here.

"Very little maintenance has been necessary on properly installed jobs," Seaberg says, adding that proper installation "was one of the problems of the early installers."

PGE has 29 commercial installations of package heat pumps, the sales divided among eight manufacturers as shown in Table I.

Nine manufacturers, including two who are not presently distributing in Portland, have a total of 36 residential installations here. The two non-distributing producers have installed heat pumps in utility employes' homes.

"From June through September, 1958, there were 17 days with temperatures over 90°," Seaberg reports. There were 15 days between 85° and 90°, 28 days 80-85°, and 19 days 75-80°, or a total of 79 days "when air conditioning would have provided comfort."

J. D. Simons of PGE recognizes that normally "cooling requirements are negligible in Portland, so the cost of a heat pump system for residential use must be compared with the cost of an equivalent heating system without cooling." It is significant to note that in 1957, residential heat pump installations here were costing $2,500-$5,000. Installed costs today, according to Seaberg, are $1,400 for a 2-ton unit, about $1,800 for a 3-ton installation, and around $2,400 for a 5-ton job.

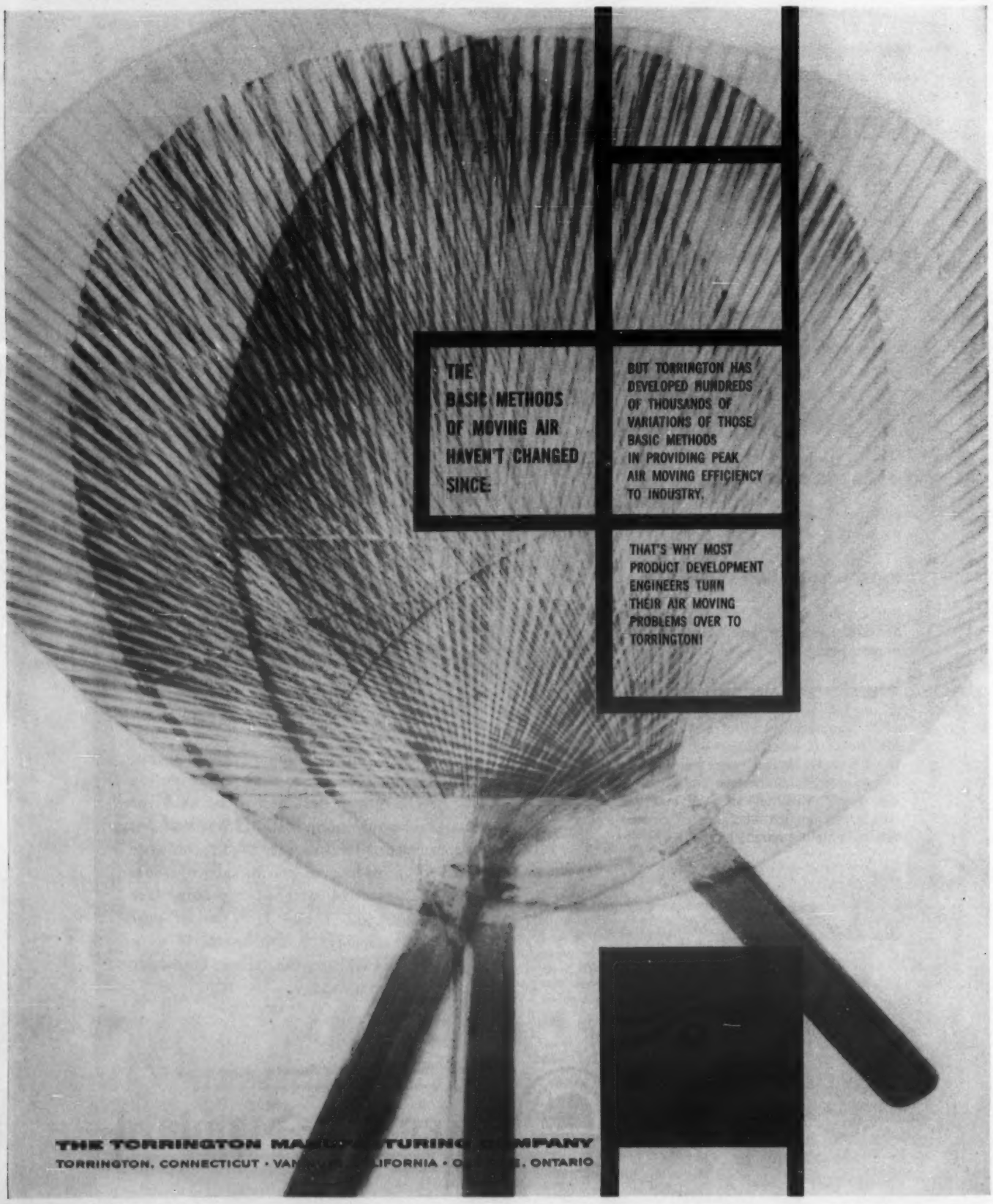
Also significant is the comparison between the 36 residential and 29 commercial installations presently on PGE's lines and the 30 residential and 18 commercial units reported in March of 1957.

In a promotional air conditioning and heat pump show sponsored by the utility this spring, four of 13 displaying manufacturers chose not to show heat pumps at this time.

Table I—Air-to-Air Heat Pump Installations on PGE System (By Manufacturer)

Mfr.	Residential	Commercial
1	13	5 (includes Rockwood Grade School—2nd heat pump school in U. S. — Opened Sept. 9.)
2	8	14
3	1	1
4 (is not distributing in Portland area yet)	2 (utility employe installations)	1
5	3	1
6	3	3
7	1	1
8	3	4 (also have 1 each water to air residential & commercial installation)
9 (is not distributing in Portland area yet)	2 (utility employe installations)	....
Totals	36	29

In addition: three large water-to-water systems—Oregonian bldg., Equitable bldg., new Sheraton hotel.


THE BASIC METHODS OF MOVING AIR HAVEN'T CHANGED SINCE
BUT TORRINGTON HAS DEVELOPED HUNDREDS OF THOUSANDS OF VARIATIONS OF THOSE BASIC METHODS IN PROVIDING PEAK AIR MOVING EFFICIENCY TO INDUSTRY.
THAT'S WHY MOST PRODUCT DEVELOPMENT ENGINEERS TURN THEIR AIR MOVING PROBLEMS OVER TO TORRINGTON!
TORRINGTON, CONNECTICUT

Air-Source Heat Pump Supplies Heating, For South Bend Bldg.

SOUTH BEND, Ind.—An air-source heat pump supplies cooling and heating to the circulating air and water systems in the seven-story office building of the Indiana & Michigan Electric Co. here.

It consists of two air heat source and sink refrigerant systems powered by two Trane 40-ton reciprocating compressors. During heating cycle both refrigerant systems supply heat to circulating water system. During cooling cycle one supplies cooling to circulating water system and the other supplies cooling to the circulating air system.

Total heat loss is 965,500 B.t.u.h. and total heat gain is 938,330 B.t.u.h.

New Raytheon Building To Use Heat Pump

SUDBURY, Mass.—What may be New England's first building to use an air-to-air heat pump is the new airborne electronic equipment engineering laboratory for Raytheon Co.'s Government Equipment Div. now under construction.

An air-to-air heat pump was deemed practical, according to William D. Rodrick, project engineer, when an engineering study revealed that the 160,000-sq. ft. single-story structure would require little heating except under the most extreme winter weather conditions. Almost all heating will be required in perimeter zones with interior zones calling for cooling a good part of the time.

NOW...ALL OVER AMERICA...
YOU CAN SELL THE MAGIC
OF AUTOMATIC YEAR 'ROUND
AIR CONDITIONING

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HEAT PUMP AIR CONDITIONER

cuts high equipment and installation costs

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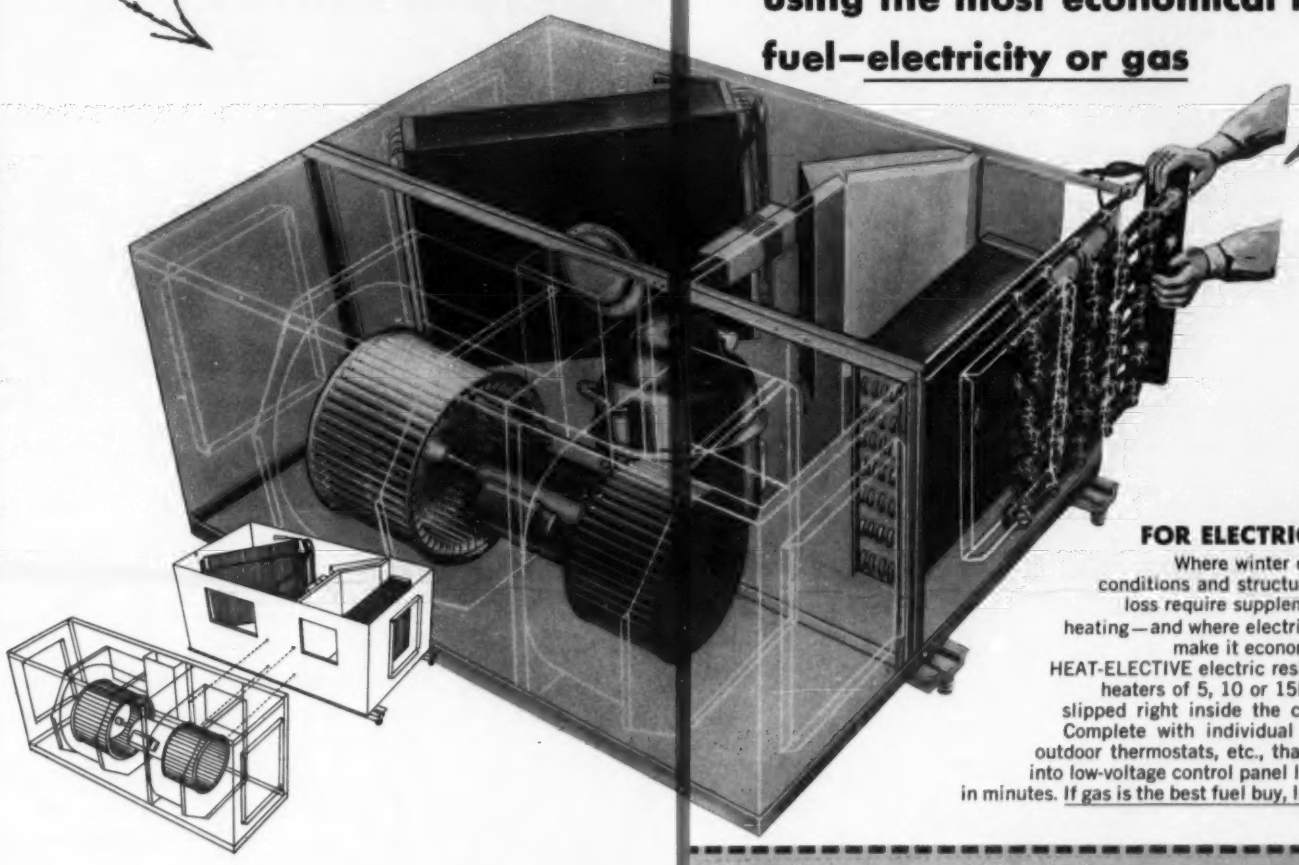
slashes operating costs by using the most economical local fuel—electricity or gas



FOR ELECTRICITY:
Where winter climate conditions and structure heat loss require supplementary heating—and where electric rates make it economical—HEAT-ELECTIVE electric resistance heaters of 5, 10 or 15KW are slipped right inside the cabinet. Complete with individual relays, outdoor thermostats, etc., that wire into low-voltage control panel literally in minutes. If gas is the best fuel buy, lift flap.

EASIER, FASTER TO INSTALL

THAN AN ORDINARY SUMMER

AIR CONDITIONER — Time-Saver split chassis construction saves installation days and dollars. Separates when six bolts are removed...passes through openings as small as 24" x 24" ...re-assembles in minutes. Goes up faster in the most crowded quarters without special rigging. Fits anywhere (only 37" x 44½" x 22" overall) in any interior location—attics, basements, utility rooms, even in closets. Exclusive Pressurized Condenser Air system eliminates need for large openings in exterior walls, other costly structural alterations. Fully charged, fully tested, completely wired. Remote automatic cooling-heating thermostat, of course. Models for two- and three-bedroom homes.

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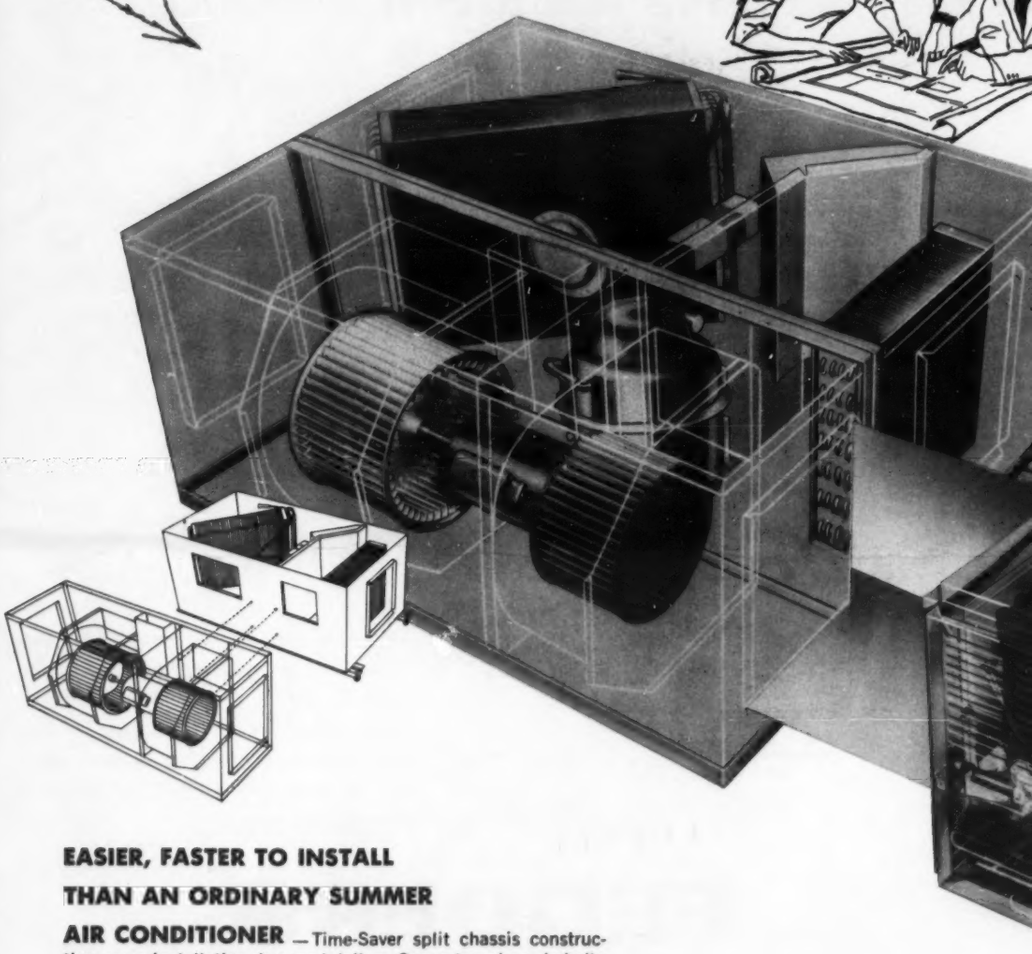
cuts high equipment and installation costs



EASIER, FASTER TO INSTALL

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AIR CONDITIONER — Time-Saver split chassis construction saves installation days and dollars. Separates when six bolts are removed... passes through openings as small as 24" x 24" ... re-assembles in minutes. Goes up faster in the most crowded quarters without special rigging. Fits anywhere (only 37" x 44½" x 22" overall) in any interior location—attics, basements, utility rooms, even in closets. Exclusive Pressurized Condenser Air system eliminates need for large openings in exterior walls, other costly structural alterations. Fully charged, fully tested, completely wired. Remote automatic cooling-heating thermostat, of course. Models for two- and three-bedroom homes.

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EAT PUMP WITH HEAT-ELECTIVE SUPPLEMENT

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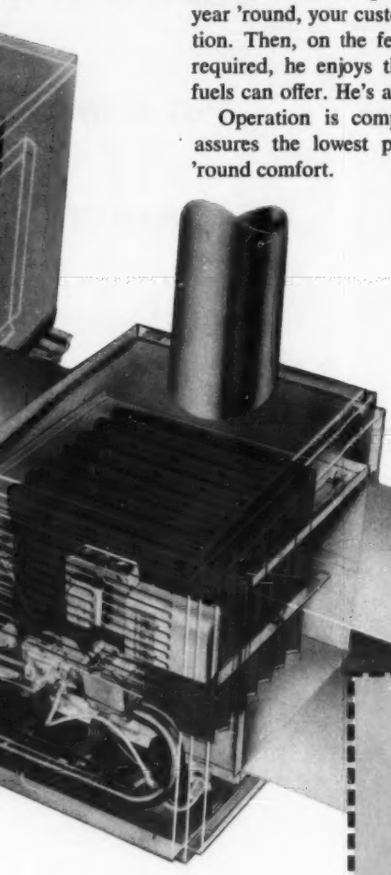
Heard what's been happening to *the* heat pump air conditioner?—the Fedders Adaptomatic, that is.

It's moving...fast. 1959 sales so far are up more than 70% over total sales last year. It's going into private homes every time it's quoted against regular cooling-only equipment...going into tract homes where they figure real close, too. *Because it costs less than many summer air conditioners... only a little more than a good heating system, in fact.* That's why Adaptomatic Heat Pump dealers are converting summer air conditioning prospects, and winter heating prospects into year 'round heat pump *customers* on job after job.

Wondering when this bonanza is coming to *your* home town? It's right outside your door now—*even if you live where high electric rates made the heat pump impractical only a few months ago.*

The new Fedders HEAT-ELECTIVE system lets you use your biggest fuel bargain—*gas or electricity*—for supplementary heating in very cold weather when heat pump operating costs can be critical in some areas. All year 'round, your customer enjoys the basic economies of heat pump operation. Then, on the few really cold days of winter when extra heating is required, he enjoys the biggest possible savings these modern automatic fuels can offer. He's always ahead.

Operation is completely automatic...a factory-wired control system assures the lowest possible operating cost...the most dependable year 'round comfort.



FEDDERS
HEAT-ELECTIVE

FOR GAS: Where gas is the most economical winter heating fuel, use this remarkably compact new HEAT-ELECTIVE gas furnace. It fits right into the duct system without requiring extra space. Incorporates all controls, including outdoor thermostat, relay, etc. Operates automatically, when required, in conjunction with [illegible] thermostat and Adaptomatic's basic control system. Heating capacities from 50,000 to 125,000 BTU's input.

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Gentlemen:

Please send me full information about the Adaptomatic Heat Pump with Heat-Elective ☐. Also about Fedders summer Air Conditioners ☐. I want to see a local sales representative ☐

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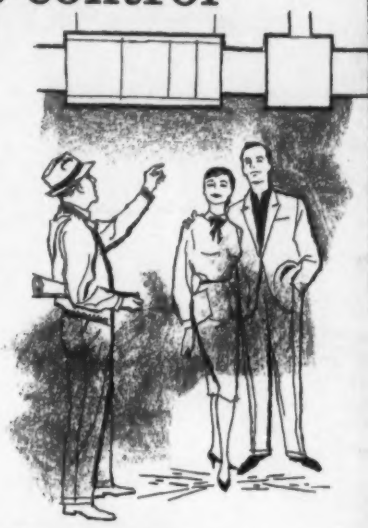
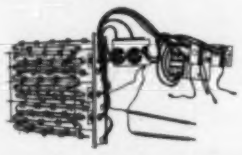
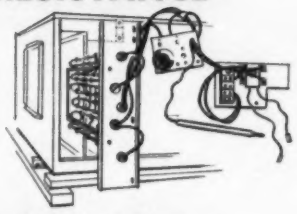
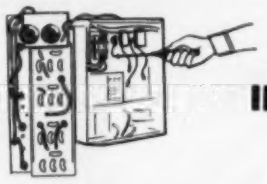
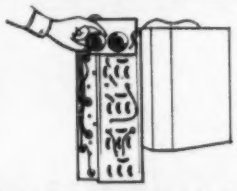
Foolproof...the easiest indoor climate control system you ever installed



THE ADAPTOMATIC HEAT-PUMP-HEAT-ELECTIVE TEAM IS READY FOR YOU (AND YOU'RE READY FOR IT) NOW

If you've ever installed any heating or cooling system, you can install the Adaptomatic Heat Pump with HEAT-ELECTIVE. Despite its amazing versatility, the automatic pre-wired control system makes installation simplicity itself. An ordinary heat loss calculation is all that is required... and if your calculations are not correct, you can clear up the difficulty in a minute or two with a turn of the wrist. Customers are bound to be satisfied. *For example:*

INSTALL THIS  **15KW HEAT-ELECTIVE RESISTANCE HEATER IN THE ADAPTOMATIC CABINET LIKE THIS** 

PUT CONTROLS  **IN LOW-VOLTAGE PANEL AND CONNECT THREE LEADS. IF HEAT LOSS EXCEEDS ORIGINAL ESTIMATES, YOU SIMPLY RE-ADJUST**  **THESE CONTROLS.**

INSTALLATION OF GAS HEAT-ELECTIVE IS JUST AS SIMPLE.

ADVERTISED IN LIFE

World's first national consumer advertisement on the whole-house heat pump, in the September 14th issue of Life shows low-cost tract homes all over America where Adaptomatic Heat Pump is featured as standard equipment. Utility companies helped builders and contractors promote these Adaptomatic Heat Pump installations.

Yes Of course you can combine the Adaptomatic Summer Air Conditioner with the HEAT-ELECTIVE gas duct furnace for a combination heating-and-cooling system that really saves space, saves time, saves money. Special HEATING-COOLING thermostat supplied.

FEDDERS

Adaptomatic

HEAT PUMPS | AND AIR CONDITIONERS

SERVICE PLUS

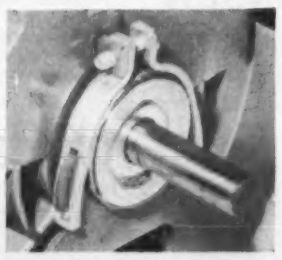
Fast Sample Service...Expert Application Engineering... and Prompt Delivery...

Yours when you choose from General Electric's
COMPLETE LINE OF FORM G MOTORS

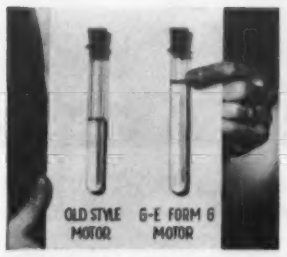
PLUS... THESE EXTRA-VALUE FEATURES THAT CUT INSTALLATION... INVENTORY... SERVICE COSTS

QUICK CONNECT TERMINALS make wiring Form G motors easy and quick. Enlarged opening also saves hook-up time.

PLUG-IN TERMINALS on outside of G-E Type KSP and KCP 39-diameter motors permit fast, easy connection of motor leads.



NEW! PROTECTIVE FINISH. Special shaft treatment minimizes corrosion, thus simplifying removal of fans, pulleys and couplings.



LONG LUBRICATION LIFE. Large oil supply and superb retention system cut maintenance—eliminates reoiling in many cases.

NEW! QUIET, SURE SWITCH. Special washer cushions switch click, maintains positive snap action under heaviest demands.

LONG-LIFE STATOR—Mylar* polyester film, Formex† wire, heavy-duty bonding dip resists heat, moisture, and electrical stresses.

*Registered Trademark of duPont Co.
†Registered Trademark of General Electric Co.

General Electric's motor story can be summed up as *service plus*. For instance:

GENERAL ELECTRIC ENGINEERS will help you tailor a Form G motor to meet your performance requirements and provide the fast sample service you need to finalize the design and tooling of new models.

APPLICATION HELP from G-E engineers—specialists in air-conditioning motors—assures you of the best motor for your product, commensurate with your specific performance requirements.

MANUFACTURING CAPACITY and multi-plant flexibility are geared for fast deliveries of volume orders. This assures you of constant availability of the motors you need.

AND THE RIGHT MOTOR IS AVAILABLE from General Electric *now*. You'll find the motor you need in General Electric's complete line of years-ahead fhp motors designed specifically for your air-conditioning requirements. If you'd like help on a specific problem, contact your nearby General Electric Apparatus Sales Office. For more information on Form G motors, write for bulletins GEA-6424 and GEA-6533, to General Electric Company, Section 702-106, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Distributors, Dealers Voice Opinions on Heat Pumps

"Already our rate of heat pump sales to conventional systems is about 50-50," proudly states Valley Air Conditioning Co., Fresno, Calif., beginning the discussion. "Rural areas here are buying practically all heat pumps over LPG or oil. More and more commercial buildings are installing heat pumps, because of low cost and no need for supplemental heaters here." Valley has installed over 650 units.

"Heat pumps will grow, grow, grow!" enthuses Lentz Enter, Phoenix, Ariz., and the feeling is seconded by Air Comfort, Inc., Beaumont, Texas, who has sold over 200 units. "Being accepted fast—in five years will outsell conventional 2-to-1," is their prediction.

In a more subdued tone, a highly successful Tennessee outlet which has installed over 1,000 units, but who chooses to remain anonymous, states "Heat pumps are being perfected. They should gain in volume and prestige during the next five years."

Detroit Firm Says Key Is Proper Installation

Enthusiasm for the heat pump is not limited to traditional geographical areas. From Detroit, George L. Johnston Co., which has guided some 80 heat pump installations in this city, notes that the key to successful applications in this climate is proper installation, all the way from the first load calculation, through the placement of the unit, the arrangement of the air circuits, the wiring. "We have less service calls per installation on heat pumps than on oil and gas heating systems," claims the Johnston company.

Utility Rates, and Fuel Availability Affect Acceptance

Correlative with geography and climate, utility rates and fuel availability have an important bearing on the acceptance of heat pumps. Many areas report rural districts going heat pump because of unreliable shipments of LPG and oil, because of unavailability of natural gas. When fuels are equally available, fuel cost is usually the deciding factor.

Thus, Conditioned Air & Refrigeration Co., Fresno, reports that the electrical rate in its area is such that "operating savings can be had over all fuels but natural gas. Some commercial jobs can even show a savings over gas. (We have jobs up to 100 tons.)"

From the other side, a distributor in St. Louis reports "With natural gas readily available and with our best electric rate at 1.75 cents per kwh., heat pumps are a definite luxury and can only be sold to the luxury-minded."

From Wichita, Kan., "Located in the middle of natural gas area where fuel costs about 50 cents per million B.t.u., I don't foresee heat pumps acquiring over 10% of the year-round business for the next five years, anyway."

Summarizing the role of fuel rates in heat pump acceptance, a Midwest distributor states flatly, "Their use will increase in direct proportion to utility rate reductions."

The distributor's relationship with the manufacturer can overshadow all considerations of geography, fuel rates, and customer acceptance. Partisanship among distributors is very noticeable; there is more reasoned feeling for and against specific heat pump manufacturers than is the case with either heating or cooling equipment, alone.

"One reason for this," offers a large distributor who recently changed brands, "is that the sameness which is inescapable in most cooling equipment does not yet exist in heat pumps. There are definite, and significant differences in design and quality among the thirty-odd brands of heat pumps," he insists.

Another outlet, questioned on why he reported so few service problems in a locality where two competing dealers mentioned numerous service difficulties, answered, "I handled one of those brands before my present one. I honestly don't feel it is a quality product. It is a reverse cycle air conditioner, not a heat pump." (This distinction between a "reverse cycle air conditioner" and a "true" heat pump is touched upon in other sections of this issue and is discussed in some detail in Technical Center.)

Added to quality differences, real or imagined, the cooperation of the manufacturer with the distributor or dealer, once a number of installations are in, is a major factor in the latter's attitude toward the producer.

A common complaint against manufacturers is their failure to back up the distributor's sales with adequate service and parts help. One of the most successful distributors in the country implied what had gone on before by answering briefly, "Now—yes" to the question concerning manufacturer cooperation.

Not so reserved was the reply from a Maryland distributor. "There has been, so far, frequent need for changing components in this area. The major manufacturers are not maintaining an adequate supply of parts and we have had repeated delays of five or more days."

"It's difficult to understand what the manufacturers are trying to do," complains a distributor from a northern state. "They come into an area like this with the apparent honest intention to field test their equipment in this climate. We go all out in providing as ideal an installation as we can. Then when the inevitable troubles begin, you can't get their people up, you can't get your letters answered, you can't get parts."

The charge of lack of cooperation and follow up also comes from successful heat pump areas as Arizona and Florida.

While a heavy majority of distributors feel the manufacturer is backing up their sales with service and parts, this contrary feeling is general enough to cause significant grumbling among distributors, with some occasionally switching brands.

Another sore spot, not very common but very noticeable where it exists, is created when the manufacturer insists that his

PERFECTION brings you

REMOTE CONDENSER

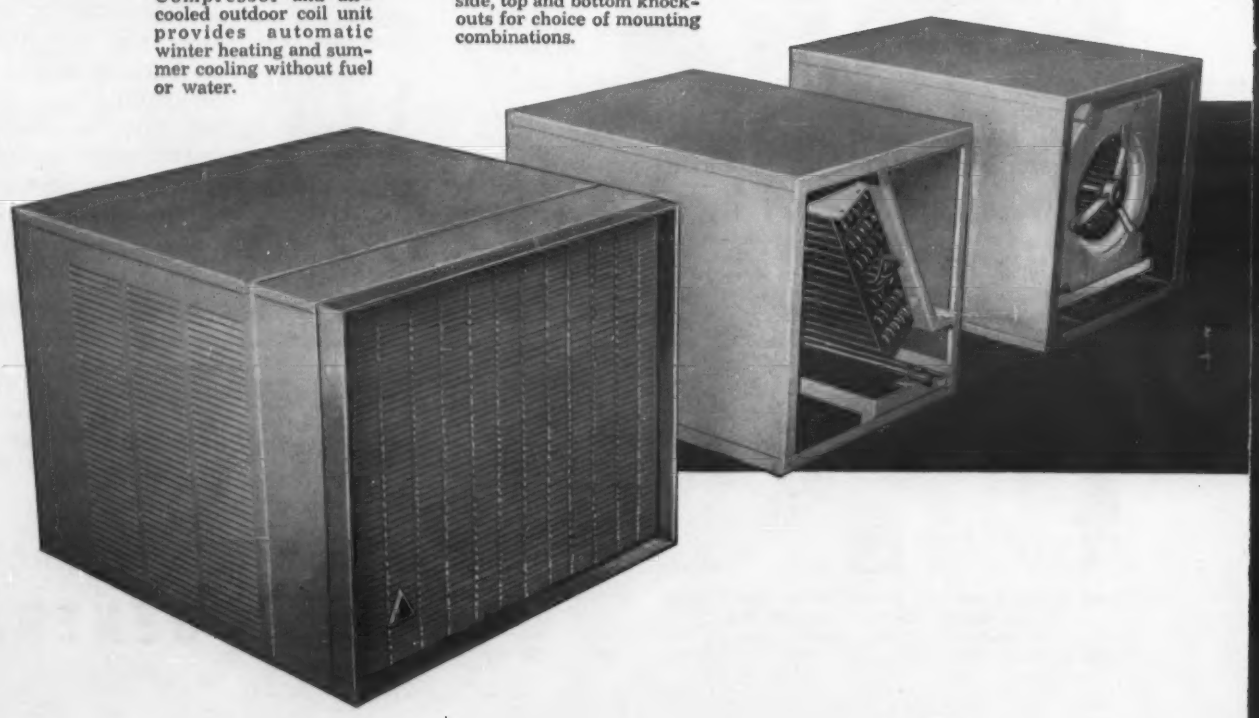
Compressor and air-cooled outdoor coil unit provides automatic winter heating and summer cooling without fuel or water.

INDOOR COIL

Compact coil unit measures 22½" x 29" x 22½", with side, top and bottom knockouts for choice of mounting combinations.

AIR HANDLER

Quiet blower is housed in matching cabinet, attaches to coil unit on side, top or bottom to provide any desired type of air discharge.



normal cooling distributor install heat pumps even when the distributor is convinced heat pumps are impractical.

One point which stands out in discussions with heat pump distributors is the unevenness of their training relative to heat pumps. Most have only attended a manufacturer's field school for two or three days; a few have attended manufacturers' factory schools; still fewer have attended both. And some outlets admit never having taken any heat pump training at all.

A result of this uneveness in training is the occasional epidemic of difficulties encountered by a single manufacturer in a given area. Practically speaking, there are those localities where scores or hundreds of heat pumps are installed but where the general level of technical proficiency among all the installer/servicemen in the area is not high enough to handle the service load which develops.

Another result: the state of the art—especially relative to installation procedures—is shadowy. Even though there are several well known installation procedures to guard against, the same errors are made repeatedly.

As an example: 74% of the installers who admitted any difficulty in installation mentioned improper air circuits, faulty ductwork as the most frequently encountered installation defect. This is a serious error, since proper supply of air to and from the unit, both inside and outside, is a key factor in its performance. "Yet, every day, installers commit errors in this phase of installation," estimates one experienced dealer. "Part of this is due to the fact that many heating people are in on the job, and they never understood air movement anyway."

"Let's face it," counters a heating contractor gone heat pump, "very few people, heating or cooling, know enough about air distribution, and they have never worked with installations where air circuits are as critical as they are for heat pumps."

Several point out that air circuit errors are often impossible to recognize until after the fact. "We know the correct principles and try to apply them. But every job poses some specific situation which calls for deviation from these principles. It may be physically impossible to avoid making a sharp bend or a narrow restriction, say. In such cases, there is no choice but to go ahead and hope the adverse effect isn't very much."

Another very important factor in proper installation is the condensate drain. Over 39% of the contractors answering held this to be the cause for a great many winter service calls.

Seventy per cent of the distributors experience the major share of heat pump service calls during the heating season. The remaining 30% who experience more service calls during the cooling season are in moderate climates, as is to be expected. But it is significant that of the 70% who report heavy winter calls, over half are also from the moderate climates.

The significanance of this fact is in that it has a bearing on the question of heat pump reliability and life expectancy.

Most manufacturers (but not all) and many distributors hold that heat pump reliability should pose no particular problem, since there are cooling and refrigerating units which run more hours per year, year after year, than is expected from most heat pumps. Some point out that longer running times, rather than frequent starts and stops with months off the line, will lengthen the service life of condensing units.

Heating Season Breakdowns More Frequent

The higher incidence of breakdowns and actual failures during the heating season, both in the North and South, is a fact which must be considered by those holding this position.

"Undoubtedly, if heating duty called for no defrosting, no changeover, the 'longer running time argument' would have validity; but it does not hold water when the practical application and performance of present heat pumps is observed objectively," contends a man who has installed over 1,500 heat pumps.

Distributors List Service Statistics

A clearer picture on the problems encountered with reliability and service emerges when specifics are discussed. In listing their most frequently encountered service problems, their most frequently serviced components:

53% of the distributors list defrosting and defrost controls,

42% list compressors—failures and burnouts,

31% list reversing valves,

19% list electrical relays and controls,

8% list leaking joints in the refrigeration cycle.

Twenty-two per cent of the distributors mentioned such miscellaneous items as fans, pressure controls, outdoor/indoor thermostats, capacitors, water problems on water-source units.

Manufacturers tend to feel that the increased electrical complexity of heat pumps, compared to cooling units, will pose a problem for the installer/serviceman. As seen above, only 19% listed electrical difficulties as service problems; 17% listed electrical difficulties as a factor during installation.

It is meaningful that the

Editorial Profile

Dynamic enthusiasm for heat pumps is manifested by the majority of distributors now handling these products. This enthusiasm is tempered somewhat by unhappy experiences in some areas; there are a very few distributors who are reluctant to handle heat pumps. Geography plays a part in distributor attitude.

Using contacts supplied by utilities, manufacturers, and its own resources the NEWS surveyed distributors whose total installation experience accounts for some 25% of all known independently installed central heat pumps in the country. Because of the nature of the market, the term distributor in this case may refer to a formal distributor, dealers, or installing contractors, since some manufacturers are using all where necessary to reach the market.

In this article, distributors give their thoughts on heat pumps—from sales to service, from marketing to engineering.

a new remote heat pump in **3** *versatile parts*

the TRI-PAK®

Another dramatic step in the FORWARD TREND that is leading the industry

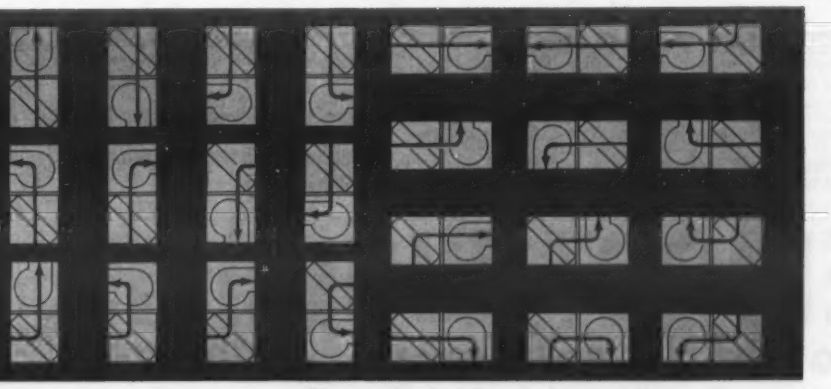
PERFECTION leadership in air conditioning design is demonstrated by a wide choice of remote and self-contained units with a history of engineering advances that have helped pace the progress of the industry.

PERFECTION leadership in sales policy set the industry standard in 1956 through extensive advertising in trade publications. At that time as now, Perfection established wholesalers to serve Perfection dealers more efficiently. Perfection flatly refused to compete with dealers by setting up branch offices. Today, others are following this proven trend that Perfection set years ago.

PERFECTION led the world in furnace design to win international honors at the Brussels World's Fair, where Perfection was the only furnace chosen to represent "residential heating of the future." For years, Perfection's 3-stage fire and patented Regulaire blower control have provided heating comfort and economy that is still unmatched. Today's growing emphasis on furnace styling and more perfect heat distribution are a part of the Forward Trend that was born of Perfection leadership.

PERFECTION design and engineering now lead again with the all new TRI-PAK heat pump, first in flexibility, first in year-round comfort. With the addition of the TRI-PAK, **Perfection brings you the first complete line of residential self-contained AND remote heat pumps. Isn't it time to stop FOLLOWING the leader . . . and BE the leader with Perfection?**

TRI-PAK's NEW VERSATILITY GIVES YOU ANY AIR DELIVERY PATTERN YOU NEED ...VERTICAL OR HORIZONTAL



PERFECTION air conditioning gives you the business! When you're bidding for business, Perfection helps you get it with a full line of remote and self-contained central-system air conditioners in 2, 3, and 5-ton capacities. Whatever the job, there's a standard Perfection component to make installations easier and more profitable for you.

Write today on your letterhead for full information and the name of your nearest Perfection Distributor

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Distributors, Dealers--

geographical location or the relative experience of the distributor makes no significant difference in his evaluation of the above factors, summarized in Table I and II. Discounting problems associated with a specific design, nationwide appraisal of difficulties peculiar to heat pumps is the same in Florida and Michigan, the same from the man who has installed 20, 200, or 1,000 heat pumps.

Most of the distributors who make specific complaints against some manufacturers' practices admit that some of the disputed points are part of the growing pains of the heat pump, while some are inherent in the distributor/manufacturer relationship.

Faster notice of design and application changes is cited as an area needing improvement by most distributors who learn of changes "long after the fact."

Table I—Most Frequently Encountered Installation Problems

(Per cent of distributors mentioning each item.)

Air Circuits (ductwork; supply to and from unit)	74%
Condensate Drains	39%
Electrical	17%
Others*	22%

*Includes fan, outdoor/indoor thermostats, piping, poor labor, inherent pulsations in refrigeration cycle.

Table II—Most Frequently Serviced Components

(Per cent of distributors mentioning each item.)

Defrost Control	53%
Compressor	42%
Reversing Valve	31%
Electrical Relays & Controls	19%
Leaking Joints	8%
Others*	23%

*Includes pressure controls, water supply, thermostats, capacitors, fans, refrigeration cycle.

TYPE INSTALLATION	SALE PRICE	ACTUAL LABOR	MATERIAL	OVERHEAD	PROFIT
Industrial Plant	$15,549.00	$855.00	$7,694.00	$733.00	$6,267.00
Residence	2,050.00	148.35	1,212.93	133.51	555.21
Residence	2,850.00	263.73	1,668.26	237.36	680.65
Residence	2,450.00	110.63	1,244.36	110.63	984.38
Church	3,150.00	270.00	1,371.81	145.00	1,047.44

PRICE BREAKDOWNS ON TYPICAL JOBS BY DUKES & DUKES, INC., Orangeburg, S. C.

* * *

Price Cutting Appearing Early In Heat Pump Merchandising

DETROIT — Even this early in the game, heat pump distributors are slicing their recommended markup in an attempt to get business.

This is the obvious conclusion when the subject of prices and profits is discussed with manufacturers, distributors, and dealers.

While there is still more profit to be gained from the sale of heat pumps than from straight air conditioners, the differential is already decreasing, agree most sources.

As a rule, manufacturers suggest a 30-35% markup from the distributor to the dealer. "Especially in those cases where the distributor will have to back up his sale to the dealer with layout, design, even installation help, the distributor should not work at less than a 35% figure," strongly asserts a major manufacturer.

"If a dealer is self-sufficient and can handle most of the job alone, the distributor can cut the markup a little, but certainly should drop no lower than 20%," this producer contends.

There is a definite tendency for the markup to be shaved even below 20% when housing projects are bid for—the feeling being that the volume will make up for the lower price.

"Unfortunately, too many people forget or neglect to set aside reserves for service; they do not include this in their price," point out several sources. Since in-warranty service costs on heat pumps are higher than on air conditioners, most manufacturers and outlets concur, this negligence can backfire seriously.

Heat pump owners are frequently tagged with in-warranty charges which theoretically are the joint responsibility of the manufacturer, distributor, and dealer. Thus, consumers have reported to the NEWS, and the distributor/dealers have verified, in-warranty, first-year charges to users as high as $100. Most dealers report that they make no charges for this in-warranty service or parts, but others show that they have charged the owner $6, $10, $42, $92.

List prices are seldom found in heat pump economics. Unrealistic, meaningless, unwieldly, fraudulent are some of the terms applied to attempts to offer or publish such list prices, and most manufacturers do not publish them.

While manufacturers state a preference to keep the distributor/dealer functions distinct, and while a couple insist on so doing, most have found it necessary to combine the functions in many cases or to use commissioned representatives to get the distribution they want.

Dealer Figures 10% Greater Mark-Up On Heat Pumps

ORANGEBURG, S. C.—"Profitwise, I find the heat pump is something which can be *sold*, not just bid upon," finds Robert C. Dukes, vice president of Dukes & Dukes, Inc., engineer and contractor here.

"Ordinarily our cost of a 3-hp. heat pump is about the same as a good 3-hp. air conditioning unit with coil and furnace, but we can sell the heat pump to the customer for at least 10% more and at the same time eliminate the low-priced furnace company from the picture."

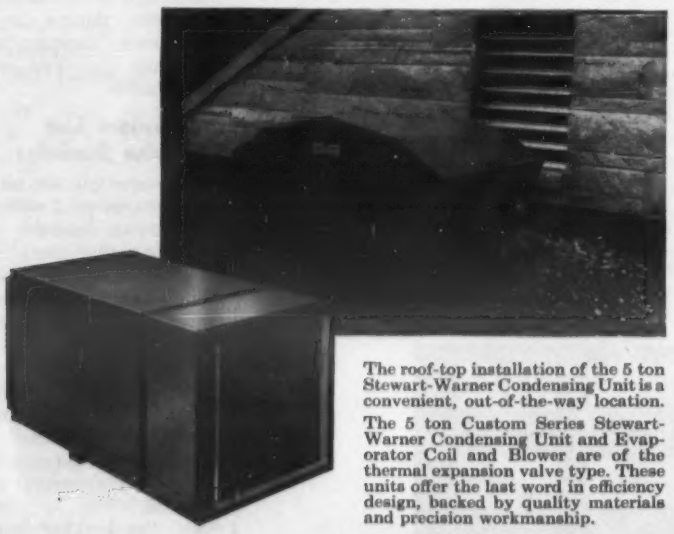
Installation of the heat pump requires less time and space than the conventional combination system, according to Dukes.

"We normally apply a 20% markup on the conventional system and 30% on the heat pump. I have found the heat pump easier to sell because the customer is interested in the newness of the equipment, the pride of ownership."

Duke's breakdown of a few heat pump installations appears in the tabulation at the top of this page.

New Haven Methodist Church, Fort Wayne, Indiana

STEWART-WARNER MULTIPLE UNITS HELP CHURCH TO AIR CONDITION ON A BUDGET



The roof-top installation of the 5 ton Stewart-Warner Condensing Unit is a convenient, out-of-the-way location.

The 5 ton Custom Series Stewart-Warner Condensing Unit and Evaporator Coil and Blower are of the thermal expansion valve type. These units offer the last word in efficiency design, backed by quality materials and precision workmanship.

To install a complete air conditioning system when building put too great a strain on the finances of this handsome modern church. Stewart-Warner multiple units offered the most satisfactory method of providing air conditioning on a programmed cost basis.

As a starter, a 5 ton Evaporator Coil and Blower were installed to cool the nursery and minister's study, with a corresponding condensing unit located on the roof.

It is planned to add another 25 tons of cooling in 1959, with an eventual total of 60 tons. Thus the church will shortly enjoy the benefits of complete air conditioning but paid for out of current income.

Multiple installation is better controlled, more flexible, more economical

The maximum air conditioning load exists only a few times a year. With a multiple unit system only enough units to handle the load at any given time will function—with corresponding economy of operation. Multiple installations obviously lend themselves more effectively to zoning.

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Oil and Gas Basement and Vertical All-year Conditioners

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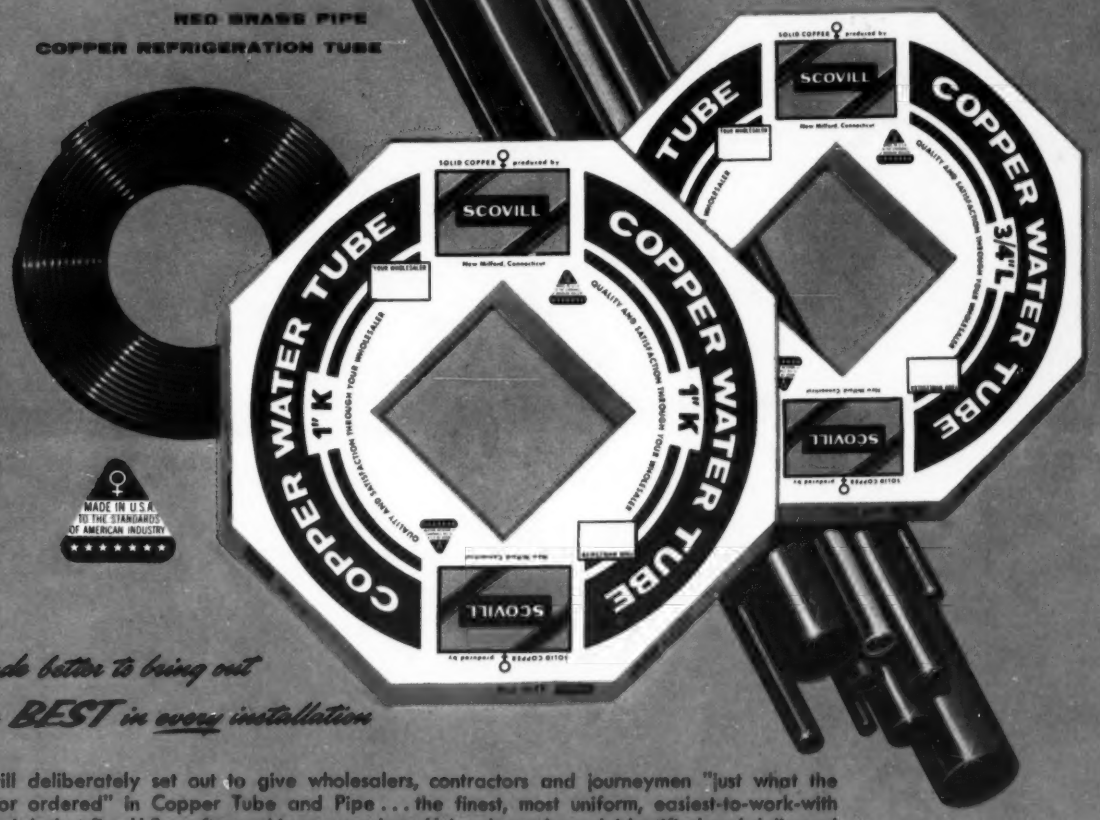
COPPER PIPE
RED BRASS PIPE
COPPER REFRIGERATION TUBE

COPPER WATER TUBE



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AIR CONDITIONING HEATING & REFRIGERATION **NEWS**

450 WEST FORT ST. DETROIT 26, MICH.

Some Firms Experimenting

No Miracle Refrigerant for Heat Pumps In Sight, Chemical Producers Agree

DETROIT—"All our troubles—low capacity on heating, compressor burnouts, slugging on changeover—could be solved at one time if the chemical companies would spend a little time and develop a refrigerant especially for heat pumps."

This wishful thinking from engineers, sometimes very seriously offered, never mentioned completely in jest, was encountered frequently enough by the NEWS to warrant obtaining authoritative reaction to it from the chemical companies.

The unanimous reaction: "No chance." While some companies admitted they were conducting experiments of a type which could conceivably lead to a miracle heat pump refrigerant, "It would be a miracle if the miracle refrigerant were found."

Most Mfrs. Use R-22

R. C. Downing, technical assistant, "Freon" Products Div., du Pont, commented, "At present, there are no new products in sight which seem likely to be as efficient and effective as Refrigerant-22 for heat pump applications." *(Editor's Note:* All but two of the present heat pump manufacturers use R-22; the others use R-12 and a patented mixture.)

"Refrigerant - 22," Downing continues, "combines all of the desirable characteristics of the fluorinated compounds, such as stability, nonflammability, and low toxicity with relatively low molecular weight and, therefore, high capacity.

Equipment Developments Seen More Likely

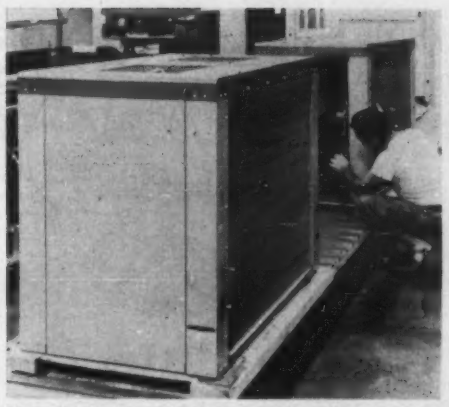
"I believe that future developments in the heat pump field will be in the direction of improved equipment, rather than new refrigerants. For example, a considerable amount of work has gone into development of small, lightweight systems for air conditioning airplanes. Your readers are undoubtedly aware of the small, fairly high-speed centrifugal compressors using Refrigerant-114 or 12, now in use by some of the major air lines.

"These developments may conceivably lead to applications in the heat pump field.

"As another example, the development of oilless compressors may someday reach a practical stage. The great variety of plastic materials available today may lead to a combination which will permit compression of refrigerants without the need for additional lubrication."

A related suggestion by a few hopefuls—"How about a lubricating oil which won't decompose at heat pump high heads and which won't congeal in the reversing valve?"

From the oil companies: "No comment."



FIRST OUTDOOR SECTIONS of the Westinghouse 5-ton heat pump get final inspection on the assembly line. This heat pump is said to be the first equipped with outdoor-indoor temperature control to maintain indoor comfort level during fluctuating weather conditions. Indoor section can be assembled for vertical, horizontal, or counterflow air movement. Squirrel-cage blower with rubber-mounted motor can be set for automatic or continuous operation. Outdoor section has automatic defrost control, vertical discharge. Supplementary duct heaters are available as optional accessories in steps of 6 kw. Minimum of 6 kw is required for defrost.

Inland Empire League Plans Electric Heat Advertising Campaign

SPOKANE, Wash. — Inland Empire Electrical League contractors scheduled a full-scale, all-media advertising campaign to promote sales of electric heat. Launched last month, the drive will continue through September and October.

Nine manufacturers have given support to the electric heat program this year and their names will be included below each of five large daily newspaper ads, it was stated. These ads will be used for listing the names of local participating contractors.

Small-space ads in daily newspapers will blanket the area with electric heat messages every day or two. TV, radio, and billboard advertising will round out the campaign.

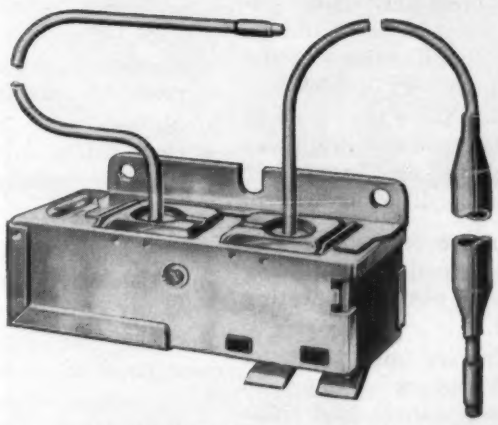
DOES YOUR APPLIANCE CARRY THIS SEAL of QUALITY?

The motor used in this equipment is protected against overloads, low voltage, over-voltage with a Mighty Mite Thermal Protector

MECHANICAL INDUSTRIES PRODUCTION CO.

223 Ash Street • Akron, Ohio

HEAT PUMP CONTROL IS SIMPLE, EFFICIENT AND AUTOMATIC WITH THESE RANCO CONTROLS

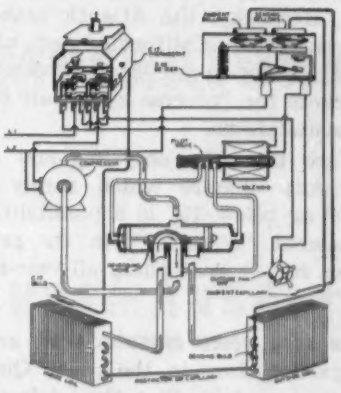


D50 DE-ICER CONTROL—Ranco D50 and D52 De-Icer Controls are the only Controls which detect coil ice quickly and automatically. Efficiently simple, they are actuated only by presence of ice on outside coil. Sensing bulb and ambient power element give control at coil. D50 is SPST, D52 is SPDT.

V25 REVERSING VALVE—Ranco V25 and V26 Reversing Valves are slide-type, pressure differential operated. Hermetically constructed with single pilot valve integral with main valve. Special by-pass prevents compressor overload during transfer period. Capacity up through 7½ tons with different valves. Solenoids available in 24, 115, 208, 230 volts with 50 or 60 frequency cycles.

Here is the heart of a heat pump system—controls and valves from Ranco to make operation simple, efficient and automatic in a wide range of climatic conditions. Combine these reversing valves and de-icer controls with a standard cycling thermostat and you give your customers completely automatic, reliable heating-cooling control.

The entire operation is simplicity in itself:



HEATING PHASE: Pilot valve solenoid is energized causing pressure differential to move slide in Ranco Reversing Valve. System operating to remove heat from the outside coil may cause a build-up of ice. As the ice accumulates on outside coil, heat exchange between coil and ambient air is reduced, lowering refrigerant temperature.

DE-ICING PHASE (diagram above): Increase in spread temperature over the clear coil temperature is sensed by the cross ambient bulb to set the Ranco De-Icer Control in action. Temperature drop opens switch to stop fan and de-energizes pilot valve solenoid operating the reversing valve to transfer heat in unit to the outside coil. All ice is removed in 3-5 minutes and coil temperature increases rapidly to close switch that terminates de-icing cycle, starts fan motor and re-energizes solenoid to return unit to heating phase.

COOLING PHASE: Limited vapor charge in ambient air element immobilizes De-Icer Control contacts in closed positions at ambients above 48° F. permitting fan operation through the De-Icer Control. Cooling is thus achieved by the same refrigerant flow as in de-icing and the compressor is operated by temperature demands of the thermostat.

For information, write for Bulletin 1687-1 "Automatic Heat Pump Operation" or Technical Bulletins 1729 & 1712-1 on V25/26 Reversing Valves, or 1691-1 on De-Icer Control.

Ranco® INCORPORATED
COLUMBUS 1, OHIO

More than 100 million Ranco Controls now in use

They'll Do It Every Time

by

Jimmy Hatlo

HEY! GET A LOAD OF THIS ITEM IN THE HOTEL MAGAZINE WHERE CHEDDAR IS STAYING "AMONG THE DISTINGUISHED GUESTS AT CRESTFALLEN MANOR FOR THE SUMMER SEASON IS CHEDDAR FUTELESS, YOUNG EXECUTIVE OF BIGDOME AND COMPANY." WOW!
YOUNG EXECUTIVE? IS THAT A NEW WAY OF SPELLING "MAILBOY"?
WHAT'S HE DOIN' WORKIN' IN THIS SALT MINE? GETTIN' IN SHAPE FOR THE POLO SEASON SWINGIN' MAILBAGS?
HE'S ONLY STAYING ONE WEEK, AN' HE'LL BE PAYING OFF THE LOAN SHARKS ALL YEAR FOR THAT...
DOES IT SAY ANYTHING ABOUT HIM CATCHING A RICH DAME THAT'S JUST CUR-RAZY ABOUT HIS GOOD LOOKS?
EVERY GUY WITH THE PRICE OF A ROOM IS A TYCOON, AN' EVERY DAME A BEAUTIFUL DEBUTANTEE....
KEEPING UP WITH THE SOCIAL DOINGS OF THE FELLOW WORKER ON VACATION....
THANX AND A TIP OF THE HATLO HAT TO BILL TRACKMAN, CHARLOTTE, N.C.
8-31
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Reverse-Cycle Air Conditioning: Expensive Now, But Watch It Grow

TREMENDOUS trend toward air-cooled air conditioning systems (municipally-supplied water is scarce in many areas) has aroused a strong smart interest in the heat pump as well.

This so-called "perpetual motion machine" warms a building when it's cold, cools it when it's hot outside—at a relatively high installation price—and (some say) low operating cost.

It has compelling fascination for engineers at this point, and is a development to be watched, despite the skepticism of many in the trade.

Wherever fuel rates are high the heat pump can justify itself economically. Ohio, Alabama, Kentucky, the Atlantic seaboard, Virginia, northern California, and almost anywhere in Florida are spots which have been markets for "reverse cycle" air conditioning installations.

Nor are they the only regional beneficients. Any climate which rarely goes above 90° or below 15° is a possibility for the somewhat "esoteric" (in its present marketing stage) heat pump all-year-round air conditioner.

To be sure some manufacturers are reluctant participators in the race. Quite a few admit, privately, that they joined the heat pump activity "only because they could not afford not to."

Reason for their reluctance: doubts as to the practicality of the heat pump for nation-wide marketing as yet.

Down the line you'll also find deliberate inactivity by certain distributors in areas where other distributors are going full tilt on reverse cycle installations. The "inactives" probably reflect attitudes of manufacturers they represent.

Perhaps the most avid promoters of heat pumps are G-E and Fedders. Both declare that the heat pump is ready now for nearly universal application. Other firms seem to feel that it is *not* ready yet for other than milder climates.

This readiness vs. unreadiness disagreement revolves around two points—actual ability of the equipment to perform reliably, and cost of operation and maintenance when the unit operates in colder climates.

Whichever camp is "right" as of now, we do know that present productive capacity is many times larger than current sales.

Costs of reverse-cycle operation for specific areas vary widely. Reason: Utility rates are arranged on the basis of ordinary residential loads. A heat pump might cost $150 to operate annually in one city, and five times that much in another—depending on regional electric power costs.

Reverse-cycle air conditioning (heat pump) manufacturers creditably claim complete absence of fire hazards. Fuel storage problems are non-existent; likewise soot and dirt, fumes, and fuel delivery expenses.

In general, if you don't live too far north of the Mason-Dixon line you can keep your house warm in winter and cool in summer with a reverse-cycle air conditioning system.

Operating charges are competitive with conventional air conditioning (including oil-or-gas heating) where electricity heating rates are low enough.

Outweighing the higher initial costs of heat pumps are such factors as improved indoor cleanliness, odor control, and those convenience factors which have been mentioned previously in this hitting-the-high-points essay.

Some utilities particularly appreciate the long-range effects of reverse-cycle air conditioning. If conventional-type home air conditioning fulfills its promise of tremendous growth, hot spells could put a severe strain on electrical generation and transmission facilities.

As a matter of fact, that is happening already.

An increased power demand in winter is welcomed by electric power purveyors. And that will occur in northern climes where electrical resistance heating elements are added to the heat pump.

Gas folk, of course, do plenty of home heating by conventional means, and would love to have an augmented summer "load" through extensive gas-powered air conditioning.

The heat pump conceivably might be equally useful to electric utilities in terms of an evened-out-all-year "load."

Reverse-cycle home air conditioning systems can be powered with gas or gasoline motors, too, it might be noted. Heat from the exhaust gases could be recovered to aid the reverse cycle job's output of warmth in wintertime.

Or, propane or butane gas heating could supplement a reverse cycle installation when quick warmth is required temporarily.

So here come the gas people again. They're chomping at the bit to promote anything which will augment or protect their household load factors.

Where extreme climate differentials do not prevail, the heat pump is an interesting and growing method of year-round air conditioning.

And, as further scientific ingenuity manifests itself, the heat pump may move ahead more rapidly than its "less sophisticated" rivals for home comfort.

Reverse-cycle air conditioning appears to have an interesting future, despite its present comparatively high installation prices, and northern-territory heating inefficiency.

Some mighty big companies are betting big money on it.

Our problem is to remain venturesome and experimental without making complete fools of ourselves.—BERNARD BARUCH.

The less a thing can be proved the angrier we get when we argue about it.—*Ethical Outlook.*

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'The Conscience of the Industry'

Published Every Monday by BUSINESS NEWS PUBLISHING CO., 450 W. Fort St., Detroit 26, Mich. Telephone Woodward 2-0924. Subscription Rates: U. S. and Possessions and Canada: $6.00 per year; 2 years, $9.00; 3 years, $12.00. All other countries: $10 per year. Single copy price, 40 cents. Ten or more copies, 30 cents; 50 or more copies, 20 cents each. Send remittance with order.

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VOLUME 88, No. 3, SERIAL No. 1,591, SEPTEMBER 21, 1959

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RACCA Plans Convention Sept. 27-30, Plus Week In Honolulu Starting Oct. 1

LOS ANGELES — Mixing business and pleasure in about equal quantities, members of the Refrigeration & Air Conditioning Contractors Association will descend on the Ambassador hotel here Sept. 27-30 for their 14th annual convention.

On three mornings and one afternoon, they will go "Prospecting for Profits" for their own business. The rest of the time they will be providing profits for others and having a good time for themselves.

Jack K. Carney, president of Commercial Refrigeration Co., Los Angeles, will set the theme of the convention when he opens the program Monday morning, Sept. 28 on the subject: "Your Profits Are Too Low."

George H. Moore, vice president of the Bank of America, will tell "How Your Association Can Clear the Way for Profits in Your Business," and Rudy Berg, president of the Air-Conditioning & Refrigeration Institute, will discuss briefly, "Assured Profits Through Good Management."

William D. Moody, president of Houston, Texas RACCA, will describe how "One RACCA Association Makes Profits Easier."

Monday's business will be concluded at noon with a "Blueprint for Action" from RACCA's action committee.

Tuesday's morning program will be devoted almost entirely to relations with labor. Annual business meeting is scheduled for afternoon, topped off by the annual banquet and dance.

Various aspects of apprentice training will be discussed in 20-minute segments by Dean J. A. C. Grant, public representative of the Joint Journeyman and Apprentice Training Committee of Los Angeles and Orange Counties; Harry L. Bowe, apprentice coordinator, Los Angeles; and Joseph Corcoran, apprentice coordinator of United Association.

Then the subject of labor and profits for the contractor will be taken up by Henry B. Ely, RACCA's general counsel and western representative; Joseph Monahan, general organizer for UA; Peter T. Schoemann, president of UA; and Leo Howard Kerns, RACCA managing director.

Wednesday morning the contractors will hear about "Profits through Advertising" from Ken McNeill of McNeill & McCleery, advertising consultant; "Profits In Service" by Al Hanson, president of National Refrigeration Sales; and how "Consulting Engineers Can Make the Job More Profitable" from Ralph M. Westcott, president of the Consulting Engineers Council.

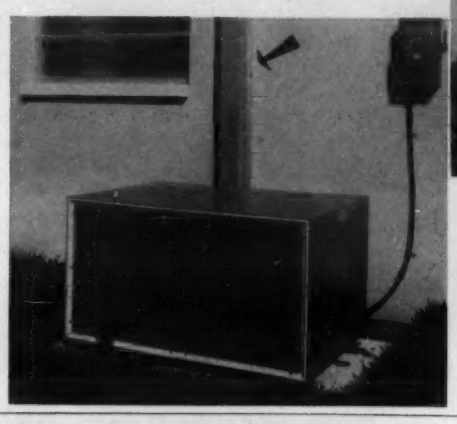
Then J. P. Glass, past national president of the Air Conditioning & Refrigeration Wholesalers, will discuss "How the Wholesaler Can Pave the Way for Contractors' Profits" and George T. Howe, Chicago contractor, will tell of "Prospecting with the Suppliers for Profits."

After the convention, on Oct. 1, the conventioneers are being invited to attend a forum in Honolulu, where an unnamed speaker will discourse for two hours on "Air Conditioning In the Tropics."

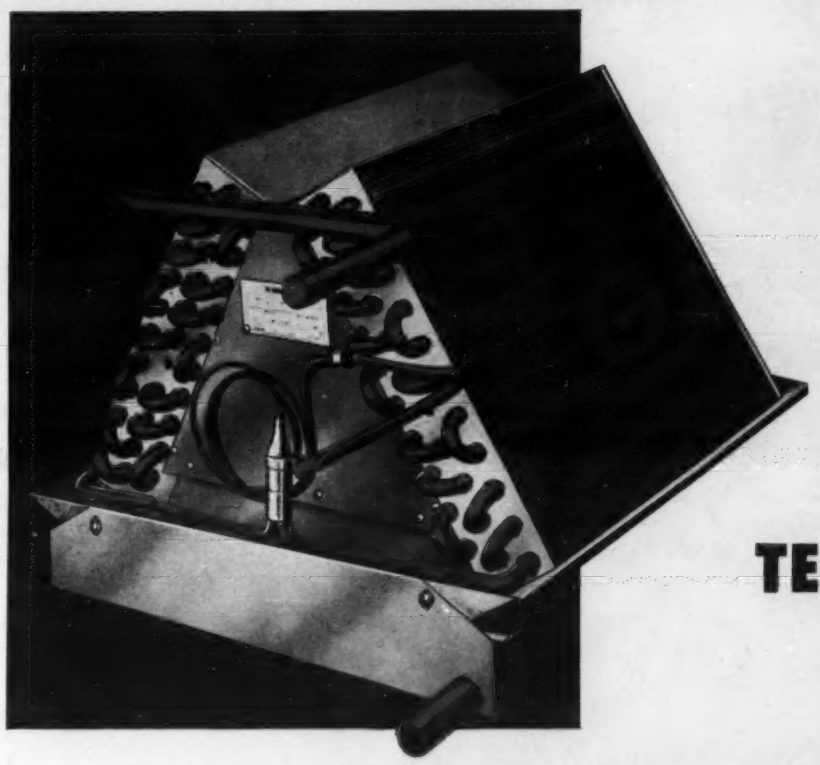
Prior to the convention, the California Council of RACCA will meet on Saturday afternoon to hear Edith Chambers, contractor, discuss the question: "How Can We Get a Federal Sub-Bidders' Listing Law?" and Richard T. Hanna, California assemblyman review "1961 Construction Legislation and the Trade Association."

EXTRA copies of the Heat Pump Issue are available and may be ordered from the publisher at rates listed in the masthead on the opposite page.

Slab Installations Of Heat Pumps



TWO VIEWS of slab installations by Heat Controller, Inc., Jackson, Mich. Jobs are in a Tampa, Fla. development. Above: Slab installation of a self-contained unit. Cork vibration eliminators, bright spangled galvanized iron rain shield are features of proper installation. Shield prevents rain from getting into the duct, also forms an enclosure for the insulation which surrounds the ductwork on supply and return air to the unit. LEFT: Slab mounted outside portion of split system heat pump. Local codes allow use of outside disconnect on the wall. Tubing to indoor unit is boxed for neatness and weather protection (arrow).



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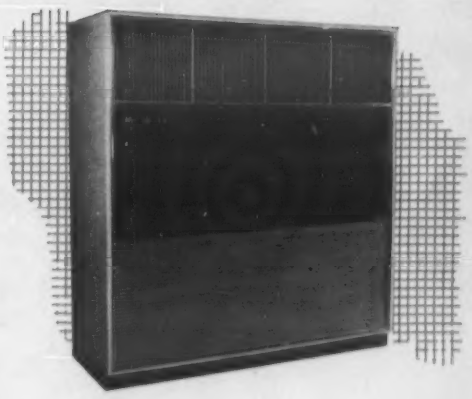

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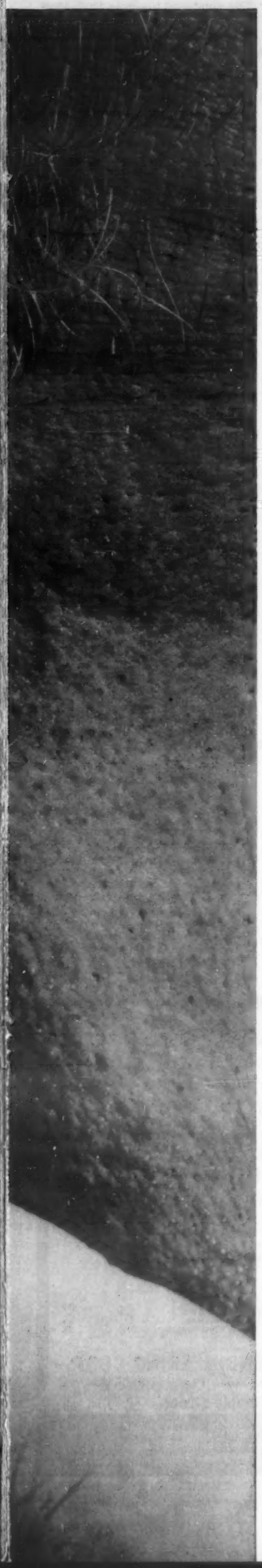

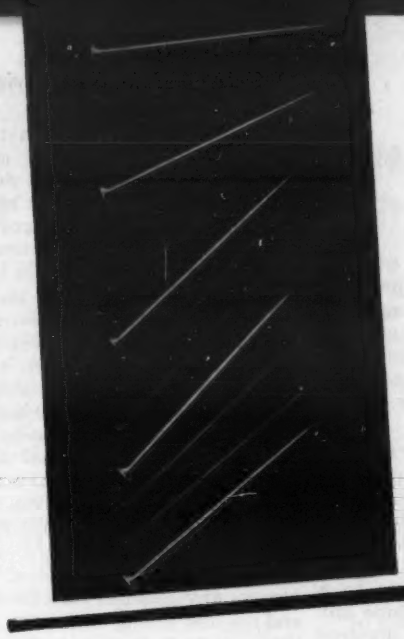

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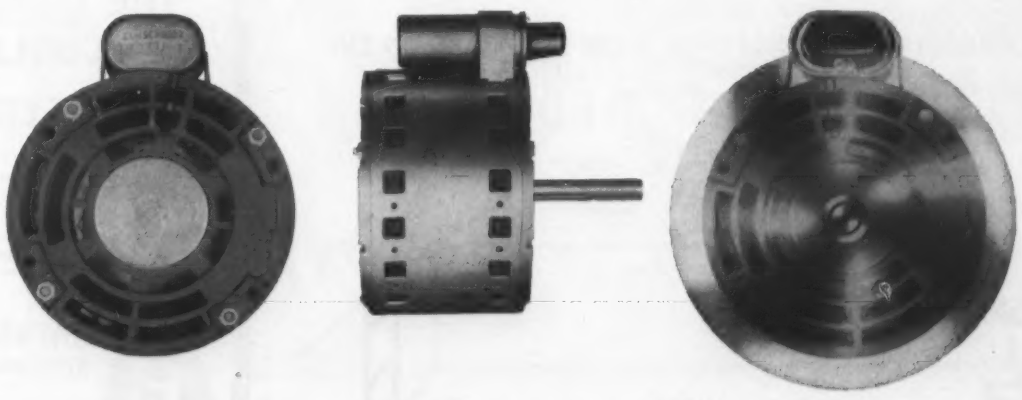

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In NEWS Interview

Mathes 'Gives Facts' on Little Rock

FORT WORTH, Texas—"Forty-five per cent of all military heat pump installations are Mathes equipment."

"There were no mass failures of compressors at Little Rock Air Force Base."

These emphatic rebuttals—in a NEWS interview—by Robert B. Starnes, vice president of the Mathes Co., Div. of Glen Alden Corp., to rumors that the company's heat pumps experienced mass breakdown at Little Rock Air Force Base, during what has become known as "Operation Deep Freeze"—a lack of heating which occurred at the base around Thanksgiving, 1958.

"A power distribution failure brought about 'Operation Deep Freeze,'" stated Benjamin R. Ebersman, president of the Texas company. Ebersman cited reported testimony by military personnel before a House Appropriation sub-committee in support of the power failure judgment, and the NEWS has verified the power failure in discussions with the Department of Defense and other outside sources.

"This distribution system was not necessarily inadequate," continued Ebersman, "but there was imbalance on the system, with some areas of the base having excess electrical capacity and others having not enough.

"During the cold spell when the temperature reached nearly zero, entire sections of the base were without power."

(Several sources, civilian and military, indicated to the NEWS that Arkansas Power & Light had looked over the proposed installation of heat pumps and the distribution system and had judged the distribution adequate. The power company denies any positive activity in this regard. See related story.)

Asked the reason for Mathes' changing of refrigeration cycles on many of the 1,535 Little Rock units, E. H. Schwartz, vice president for engineering, stated that Mathes volunteered to increase the size of certain units to a nominal 3 ton "to preclude any doubt that the homes involved will be more than adequately heated.

"Original specifications did not specify B.t.u.h.," Schwartz added. "They said, in effect, that the equipment which is installed shall adequately cool when the outside temperature is 105° and the indoor temperature is 80°, and they shall adequately heat when the indoor temperature is 70° and the outdoor temperature is 0°."

According to Schwartz, there has never been any question of the size of the units for adequate cooling, but the Air Force and Mathes were concerned about the size of some of the original units due to new, on-the-base, tests conducted by an *ad hoc* (for the present case only) committee, which included Paul R. Achenbach of the National Bureau of Standards.

"The Mathes Co. decided to remove any grounds for concern and is increasing the size of these units," president Ebersman indicated.

Starnes emphasized the company's feeling that "satisfied customers are our best advertisement. We feel that satisfaction is indicated by the fact that the majority of new installations calling for heat pumps are specifying systems designed around Mathes high standard equipment.

"We have now installed or contracted for more heat pumps for military housing than any other single manufacturer," insisted the vice president.

Discussing service problems encountered at Little Rock and elsewhere, Starnes and Schwartz agreed there were problems in the beginning. Both quoted the old saying "The price of progress is trouble."

"We will be the first to admit that mistakes were made in the early stages. Industry must keep in mind, however, that at the time of the Little Rock bid, Mathes was the only split system air-to-air heat pump available and in production," Starnes held. "No other company was ready to take on a single installation of this magnitude, largest in the world," he insisted.

Schwartz pointed out that at first some of the problems were unique. "Because the heat pump performs more functions than a straight cooling system, service must be increased accordingly." The company predicts that companies with less experience than Mathes are in for the same sort of developmental problems.

"Mathes and other older producers of heat pumps are now finding service no major factor in their merchandising," Schwartz feels.

In a joint statement to the NEWS, the three executives emphasized their confidence in the future of the heat pump. "The heat pump will inevitably become the most efficient means for providing year-round comfort. Mathes engineering is keyed to the continued advanced development of heat pumps, and the company is determined to continue as a top volume producer of what we consider the great, golden future of the entire air conditioning industry."

Military Statement On Little Rock

We have been informed by the Air Force that the failure of the heating equipment was caused by the inadequacy of the electrical distribution system. The distribution problem has now been corrected.

The Air Force has also informed us that, prior to the distribution failure, they had discussed with the contractor the capacity of some of the heat pump units and that, at this time, the contractor is replacing certain units with heat pumps of increased capacity at no expense to the government.

This resolves a matter of specification interpretation.

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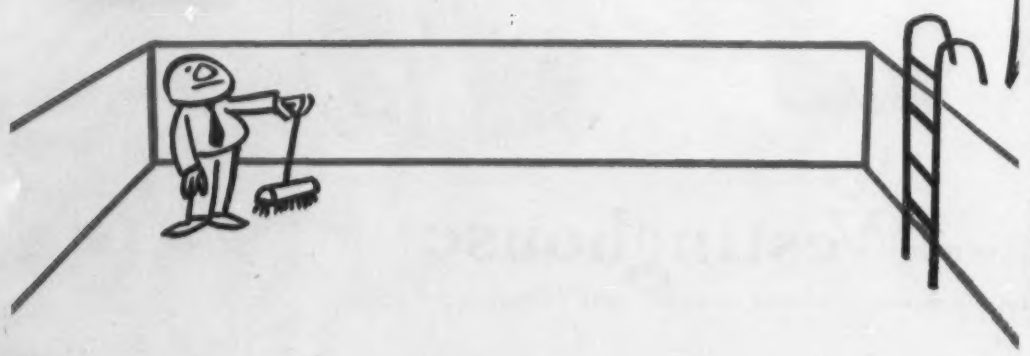

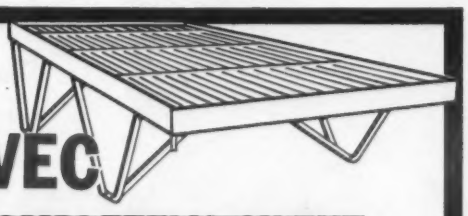

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NBS Says . . .

Variables In Testing Methods A Factor In Conflicting Ratings

DAYTON—Test methods used to rate heat pumps need considerable improvement before accurate and directly comparable ratings will be possible, according to Paul R. Achenbach, chief, Air Conditioning, Heating, and Refrigeration Section, National Bureau of Standards.

Achenbach made this remark in his talk before the recent Air Force Air Conditioning and Refrigeration Conference here.

Speaking with the NEWS after the formal conference, both Achenbach and a spokesman for one of the manufacturers presently supplying heat pumps for the Air Force agreed that there seem to be three ratings:

1) the rating obtained by the National Bureau of Standards,

2) that claimed by the manufacturer,

3) that obtained when the unit is actually performing in service.

The NBS chief mentioned several variable factors which he feels must be standardized before ratings can become reproducible and directly comparable between different laboratories. "For example, what is a 5° design temperature?" he asked. "We have chosen to define this as any day at which the temperature reaches 5° any time during the day."

It is difficult to obtain design conditions in a laboratory, and common technique is to determine heat transfer at some condition other than design, then extrapolate.

"Another complicating factor is that the heat loss from a house is always greater when the house is first activated, or put into use. The effect of the structure, of the furnishings confuse the picture," he said.

Emphasizing that there is a great need for more information on heating/cooling loads and their calculation, Achenbach estimated that present methods are often up to 25% in error.

Further investigation of heat pump performance by the NBS will include the complete metering of five houses.

One reported result on tests already completed at NBS: heating capacity of the unit dropped some 9% at 35° while frost was on the coil. During this time, the unit was defrosting every 35-40 minutes.

Power Company Denies Active Role In Little Rock Electric Failure

LITTLE ROCK, Ark. — Although military spokesmen imply that "the local utility"—in this case, Arkansas Power & Light—had a hand in designing the electrical distribution system on Little Rock Air Force Base, the utility denies that they took an active role.

"While we supply power to the base," states vice president W. M. Shepherd, "the base purchases the power at primary voltage and they do their own distribution.

"In the case of the heat pump installations, the base hired an outside engineer, since deceased, to plan the distribution. While we were talked to about such items as the diversity factor which could be expected, we took no active part in the design of the electrical system."

Shepherd, in the interview with the NEWS, insists that, in spite of the difficulties encountered at Little Rock, "the Air Force has saved money on the original purchase and on long range operation."

He supports his position with data gathered from 15 metered houses on the base, meters placed at the request of the base to enable a thorough study of heat pump performance and power consumption of the unit plus all other appliances. Arkansas Power & Light will publish its findings at a later date, Shepherd stated.

"One thing which no one foresaw was the impact of regimentation on the use of electrical power. Unlike the normal city of 5,000, these people all get up at the same time, toast at the same time, lunch at the same time; they apparently even wash clothes at the same time. Indeed, it turned out that when occupants were instructed not to use their electric clothes dryers, power supply was enough to keep the heat pumps operating for the rest of the cold spell.

"And that cold spell—an almost unheard of 5° which had never been anticipated."

Shepherd feels the present changing of refrigeration cycles is "unnecessary." One factor which may have led to doubts about capacity, he indicated, is the tendency of new occupants to hold the indoor temperature at 80-82° during heating and 70-69° during cooling, "a full 10° higher and lower than design conditions normally call for."

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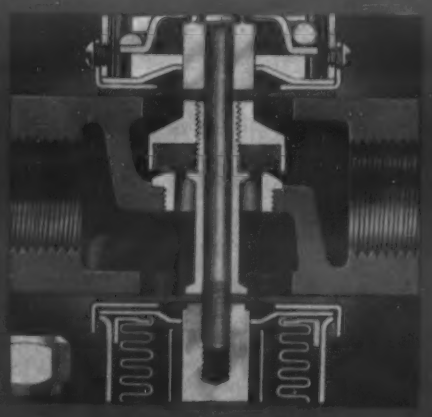

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Utilities Look at the Heat Pump

Power Companies Strongly Favor It Although Some Have Reservations About Load Factor

The most frequently voiced reason for utility interest in heat pumps is the increase in the number of power companies experiencing summer peaks. This factor is described in an accompanying article. Essentially, the point is that the utility so affected would logically be well disposed toward any equipment which increases its winter load.

More often true than not, this point is not universally agreed upon by the power companies, especially in those areas where supplemental resistance heat forms a considerable portion of the load.

A spokesman for the Philadelphia Electric Co., for instance, commenting on the fact that so many heat pump installations make use of supplemental heaters, said that these heaters come on during the coldest weather, when the demand for power is at its peak. "This is not a desirable situation for a power company.

Where heat pumps move in rapidly, construction of power distribution facilities becomes a critical problem, reports Public Service Co. of New Mexico from Albuquerque, and the problem is compounded when extensive resistance heat must be taken into account.

"Load factor" is the term used when discussing this phase of heat pump performance and application. "Suppose the total requirement for the unit, compressor and resistance is 20,000 kw," explains Pat Dwyer of Detroit Edison. "The utility must supply 20,000 kw capacity for the entire year, even though this amount of power may only be called for 10% of the time."

Other power people point out that the problem is magnified when a housing development, for example, goes heat pump, or wherever more than a few installations go in on one leg of a distribution system.

Local conditions bear on the utility attitude, and some don't see resistance supplemental heat as any problem at all. "Transmission system capacity increases due to cold weather and has so far been adequate to handle the load," reports Arizona Public Service Co., Phoenix, which has some 1,500 heat pumps on its lines. Others report the same experience.

In commercial applications, one utility suggests, it is foolish to consider the horsepower demand of the heat pump as being added to the building load demand. "Heat pump peaks hit early in the morning, then fall off as the building demand increases." In support of this contention, the authority shows that all actual operating costs on metered commercial heat pump installations have been below estimates.

In spite of such operational difficulties, those utilities which favor heat pumps tend to go all the way in helping the manufacturer and distributor get sales, while keeping the interests of their customers in mind. One such dynamic utility reports, "Our service is available to all commercial customers or their architects and consulting engineers.

Utility Describes Services Offered

"This service includes: 1) determining the heating and cooling load; 2) selection of the equipment; 3) preparation of all drawings and specifications; 4) obtaining competitive bids; and 5) furnishing a supervising engineer to make certain the system is properly installed."

The service is supplied at no cost.

Even while performing such services, most utilities look forward to the day that distributor organizations are equipped to handle multiple unit installations of heat pumps. At that time, the utility will enter the picture only in the case of larger custom built systems.

From the manufacturers' viewpoint, the most effective help utilities can provide is to lower their electrical rates for winter heating. This recognizes the fact that the heat pump, except in areas where power is extremely cheap, costs more to operate on heating than flame-operating heating equipment.

And many utilities are doing just that; over the last two years, the NEWS has reported rate reductions from all over the country.

Utilities Must Be Wary of Rate Reductions

"But the utility must be careful," admonishes a Midwestern power executive. "In our panic to keep gas from getting the heating job (and subsequently the cooking, water, and appliance load), we must consider long range profitability. I know of situations where all the increased power usage possible with the building of distribution to handle heat pumps could not possibly make up, within the lifetime of the equipment, for the capital outlay for the distribution setup."

Controlled as they are by public utility commissions, the power companies must exercise great judgment in adjusting rates in an attempt to get more customers. And rate structures over the country differ greatly not only in monetary costs but in the actual breakdown of increments.

Some companies, for example, apply a special heating rate after the first 500 kwh. consumption; others after 700 kwh. Some lower the rate after the first block, raise it again after the second increment. Others have no special heating rate as such, and merely apply their lowest existing rate to heat pump use.

In developing a territory which has not yet gone heat pump, the manufacturers normally work with the local utilities in ferreting out likely sales, in installing and following up the sale with service and maintenance. In a few cases, the utility will go so far as separately to meter heat pump installations and make the result-

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Your salesmen have outstanding product advantages to talk about with Coolerator. To help you close sales, the amazing LECTROFILTER® is the greatest single new feature since air conditioning was introduced! Special Permalife® finish gives unmatched weather protection. Easy installation, easy service whether remote or self-contained.

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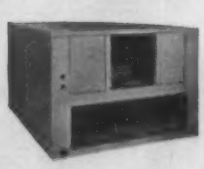
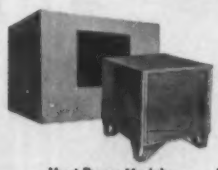
A market area for every dealer or contractor—with territory protection—insures higher sales volume. Now, Coolerator offers you such *protected territories!* You can develop your market potential by selling quality and features—instead of price only. Every dealer knows that protected territories mean more full profit sales.

Coolerator Offers A Complete Line With Units Designed For Ease Of Installation And Service Accessibility

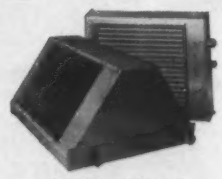


Self-Contained Models* 2, 3 and 4 hp sizes *Decorative fronts optional

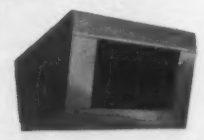


Heat Pump Models 3 ton remote system

Remote Condenser Sections 3, 4 and 5 ton sizes



Horizontal and Vertical Coil Sections 3, 4 and 5 ton sizes



Blower-Evaporator Coil Sections* 3, 4 and 5 ton sizes

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ing information available to the producer.

Cooperation One-Sided

In a few cases, this cooperation has been one-sided, according to some power companies who complain that the manufacturer seems to lose interest after a few sales are made. "Distributors and dealers suddenly find it difficult to provide service; the manufacturer can't get parts to our city," bemoans a northern state utility.

"Dealers and captive manufacturers' outlets don't want to give service as fast as the homeowner needs it," offers another.

When this happens, the utility is forced into providing service on heat pumps. "We feel obligated, not only because the heat pump owner is a customer, but because we were so active in getting him to buy the unit in the first place."

"This lack of proper field follow-up, of providing service and parts after the sale; this pushing more units in an area than there is personnel to maintain has already backfired on some manufacturers and will continue to do so for a little while yet," predicts a utility purchasing agent who had to threaten cancellation of several million dollars in purchase orders of other equipment to get a heat pump manufacturer to cooperate after "they deserted us with almost 100 installations of their units."

Recognizing these weaknesses in the manufacturers' operations, some utility people still insist "We cannot expect the manufacturer of heat pumps to move much faster until our own industry gets behind them with all the know-how that we possess."

Utilities State Positions Articulately

For, against, or indifferent to heat pumps, power company personnel state their positions articulately, sometimes but not always reflecting the "geographical factor"—the undisputed success of heat pumps in the southern states.

Thus, Alabama Power Co., Birmingham, holds, "The heat pump is well adapted to our climate; its cost of installation is closely competitive with any year-round comfort conditioning of equal quality, and its cost of operation is generally less than that of other year-round systems."

Iowa Power & Light, on the other hand, states emphatically, "The heat pump has not proved itself mechanically or performance-wise in this area. The load factor and peak load characteristics of the heat pump make it a less desirable load than straight resistance heating. Gas air conditioning is a better method of shaving the summer electric peak which we experience."

Also from Iowa, Interstate Power Co., Dubuque: "Our area ranges from 6,200 to 7,800 degree-days. Present heat pumps are definitely confined to lower degree-day areas."

The geographical factor is manifested in comments from other areas:

Florida—Gulf Power Co., Pensacola: "We predict that 90% of the new homes built 10 years from now will be equipped with heat pumps."

California — Dept. of Water and Power, Los Angeles: "We believe that the electric utility industry's objective of doubling kwh. consumption in the next ten years will depend in great measure upon promotion of the heat pump for residences."

California-Pacific Gas & Electric Co., San Francisco: "The heat pump offers good load building characteristics."

"Not so, here," counters Public Service Co., Denver, "The heat pump offers a poor load factor from our viewpoint. It cannot compete with low cost natural gas in this area at low temperatures which we have."

Many power company spokesmen feel that the emphasis on the geographical factor overlooks an important sales point. "When we talk climate, we somehow automatically visualize the heat pump in residences," cites a New Yorker. "Yet, I'm convinced that the big market for heat pumps is in commercial installations and in these jobs the climate is a much less important factor."

"The industry looks at that great big—in numbers—residential market and is hypnotized," says another, echoing sentiments the NEWS has also heard from heat pump manufacturers.

(Approximately 62% of the central heat pumps installed in this country have gone into

(Concluded on next page)

Editorial Profile

INDISPENSABLE. That word summarizes the role of electric utilities in the development of heat pumps in the eyes of many, of most manufacturers. Distributors tend to agree.

Utilities have been the most active promoters of heat pumps—more consistently aggressive in their sales efforts than even the manufacturers. The power companies run ads, conduct training courses for distributors; some will calculate the heat load and loss, specify construction, insulation, design of the heat pump—do everything but make the actual sale.

Obviously, there are economic motives behind this aggressive push on heat pumps and resistance heating. Not so obvious are some of the hesitations about the promotional activity, the doubts about heat pumps—in spite of the battle against flame fuels.

Occasionally, even the most cooperative of utilities have found themselves at odds with manufacturers.

Here's how General Electric has reduced capacitor size and weight since 1956

Typical Ratings	Reduction Volume	Reduction Weight
20 mfd—370 V	24%	25%
25 mfd—370 V	34%	29%
20 mfd—440 V	28%	24%

25 mfd—370 V rating pictured

FROM GENERAL ELECTRIC

NEW Flat-oval Capacitors

PROVIDE HIGHER μf RATINGS IN LIGHTER, SMALLER CASES

Now General Electric offers a new line of motor-run capacitors designed especially to save space in today's more compact air conditioning equipment.

The new capacitors feature the "flat-oval" case—a unique design that allows maximum volt-microfarad ratings in smaller, lighter capacitors. By making optimum use of available space while maintaining sufficient case surface to provide adequate cooling, flat-oval capacitors operate with uniformly high characteristics. The table above shows how design innovations, such as the flat-oval case, have enabled General Electric to reduce the volume and weight of air conditioning capacitors.

New, flat-oval capacitors also feature an improved phenolic cup design. While maintaining increased creepage distance, the new cup eliminates the collection of troublesome moisture. The new cup shape also makes possible painting the cover, as well as the case, with General Electric's corrosion-resistant Granite-Gray paint.

For complete details on General Electric's new air conditioning capacitors, contact your nearest Apparatus Sales Office; or write to General Electric Co., Section 448-5, Schenectady, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Electric Utilities and Heat Pumps--

(Concluded from preceding page) homes, NEWS investigation reveals. The remaining 38% are in commercial and industrial establishments.)

Those who are not hypnotized can sell heat pumps in more severe climates. The "Around the Country" table shows that New York City, for example, has a high ratio of commercial to residential sales, as has Detroit, and Hartford, Conn.

With the lower balance point attainable in commercial and industrial structure, market development should begin there, in the opinion of Consumers Power Co., Jackson, Mich.

As one New York utility phrased it, "The outlook for heat pumps is good in climates where equipment sized for cooling can heat the space without supplemental heat. In our climate, this is true only of buildings with high internal heat loads."

A reluctance to accept resistance heat as the final answer for supplemental heat is widespread throughout the power companies, even those who like straight resistance heating with convectors and panels.

"Minus 20 air is not yet a satisfactory heat source," opines Northern States Power Co., Minneapolis, "and supplemental resistance heat is a questionable answer."

Cleveland Electric Illuminating Co. predicts flatly that "the future of heat pumps, nationwide, will become brighter to the degree that elimination or better control of supplemental heat is obtained," an opinion seconded by a Washington State utility.

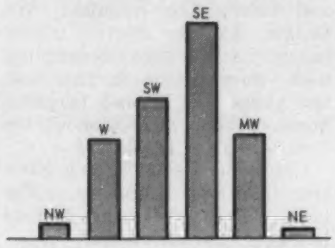
A utility attitude which both puzzles and disturbs heat pump manufacturers is the fairly frequent implication that heat pumps are not quite what they should be, that things will be better when the product is improved.

Sometimes this attitude is expressed mildly as "The dependability of the *latest* models and more reasonable operating costs will tend to gain further acceptance for the heat pump."

Or, "Improvements and new developments in heat pumps will make them the outstanding source of home heating *in the future*."

Finally, and more specifically, "Air-source is a must to gain general acceptance. COP must be improved and cost per ton reduced to gain a sizeable market."

Where Manufacturers Are Directing Sales Effort



BAR Lengths represent degree of effort for each geographical area.

Cancer Research Lab Installs Heat Pump

BIRMINGHAM, Ala. — A reverse cycle, air-to-water York heat pump provides 70 tons of cooling and 70,000 B.t.u.h. of heating for the five-story Kettering-Meyer Cancer Research Laboratory of the Southern Research Institute here.

How 25 Firms Share Heat Pump Sales

(Central Units—from time manufacturer entered field till supplying figures below.)

Mfr.	Total Sales	Ratio of Self-Contained-to-Split	Estimated 1959 Sales
A	16,000*	....	....
B	12,500	40/60	6,500
C	10,000	90/10	2,000
D	6,400	49/51	1,100
E	6,000*	....	....
F	4,500	100/0	4,000
G	4,000*	....	....
H	3,000	34/66	1,880
I	2,835	10/90	1,900
J	1,500	99/1	2,000
K	1,000	0/100	1,000
L	825	30/70	350
M	800	10/90	500
N	500*	20/80	....
O	500	10/90	350
P	500	70/30	500
Q	400	80/20	200
R	400	75/25	700
S	400*	100/0	....
T	148	0/100	200
U	50	100/0	100
V	15	0/100	100
W	"No Sales Yet		
X	"Buying from OEM."		
Y	"Just entering field—each installation is factory controlled.		
Totals	72,273		23,380

*NEWS estimate not officially verified by manufacturer.

* * *

Growth of Heat Pumps

Year	Shipments
1953	986
1954	1,900
1955	3,551
1956	4,746
1957	9,244
1958	17,000
1959*	32,000

*NEWS estimate.

'World's Largest' Heat Pump To Go In Australian Bldg.

SYDNEY, Australia—What is reported to be the world's largest heat pump air conditioning and heating system will soon be installed in the new head office of the Australian Mutual Provident Society here.

Frigrite, Ltd., Worthington Corp. licensee and distributor in Melbourne, will install one 200-ton and two 600-ton Worthington centrifugal compressors in the 26-story H-shaped building, which will be the tallest skyscraper in Australia. The units will supply 1,400 tons of summer cooling and 10,000,000 B.t.u.h. of winter heating.

Known as the AMP building, the new landmark will be located in downtown Sydney, overlooking the harbor, whose water will be used to cool and heat the building.

In the summer, the condensers will be supplied with 4,500 g.p.m. of sea water, which will be pumped from the harbor to the sub-basement of the AMP building through a 300-ft. long tunnel.

In the winter, the system will use the reverse cycle method by extracting heat from the harbor water through the intermediary of salt water-fresh water heat exchangers.

The distribution of heat throughout the building itself will be accomplished by hot water circulated through coils installed around the perimeter of each floor. In the summer, these coils will be supplied with chilled water.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

BEFORE YOU BUY, THINK:

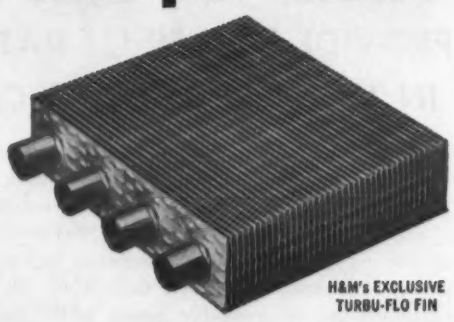
Do you need 6, 7, 8 or 10 fins per inch?

Halstead & Mitchell supplies Turbu-Flo Coils with the fin spacing you want

Why accept someone else's "standard" when your own judgment dictates another fin spacing for the specific job at hand. Now you can call on Halstead & Mitchell for Turbu-Flo coils with 6, 7, 8 or 10 fins per inch to meet your individual size requirements.

H&M makes coils for use with most refrigerants, steam (standard or non-freeze coils), hot or chilled water. All coils are available from 1 to 8 rows deep, with finned heights of 12 to 36 inches, and finned lengths up to 10 feet. Aluminum fins on seamless copper tubing are standard, though copper fins may be ordered. Casings come in heavy gauge galvanized steel or aluminum, with connections for left or right hand.

When perfect performance depends on correct design, specify H&M coils. Ask your wholesaler for complete information or write to Halstead & Mitchell, Bessemer Bldg., Pittsburgh 22, Pa.



H&M's EXCLUSIVE TURBU-FLO FIN

HM Halstead & Mitchell

Finned Coil Products • Air-Cooled Condensers • Water-Cooled Condensers • Cooling Towers

No Plastic, Rubber Seal In 4-Way Valve

● A new four-way valve for heat pumps and reverse cycle refrigeration systems has been announced by Product Engineering, Dept. AH&RN, 9703 Southwest Hwy., Oak Lawn, Ill.

The ⅞ in. suction port size valve features all-metal construction, using no plastic or rubber seals.

The interchange piston design provides pressure seating on the low side without any seals other than the trapped oil film.

Internal slave high side pilot provides four-way shifting with a conventional three-way control. This, the company says, eliminates midshift stalls and allows a greater range of operating pressure.

Exclusive 90° porting reduces pressure drop to the equivalent of one elbow in the suction line. Short gas path through the valve reduces heat exchange surface common to both suction and discharge gas.

With a tight-closing pilot, total leak-by is less than 1,000 c.c. per minute with dry air at 150 p.s.i.

Valve is supplied with any standard voltage coil and can be supplied with special coils at user's request.

Company also plans to make a ½ in. hermetic valve for window units and a 1⅛ in. non-hermetic valve. The ⅞ in. valve is non-hermetic.

Fractional Hp. Motor Made More Compact

● A new 48-frame fractional horsepower motor designed primarily for the heating and air conditioning industries has been announced by Westinghouse Electric Corp., Dept. AH&RN, P. O. Box 2099, Pittsburgh 30.

Length of the new motor is up to ½ in. shorter than the previous design to match recent trends toward greater compactness, the company said. The new designs are for shaded-pole motors up to ¼ hp. and permanent-split capacitor motors up to ⅓ hp.

"Using 'Permawick' material, the motors will, under normal conditions, operate for a minimum of five years without lubrication," it was stated. A novel locked-type washer system is said to practically eliminate washer noise.

Units are designed for versatility of mounting. Several different enclosures are also available. Motors are available either with line leads or a terminal board mounted over the vent holes in the frame, the manufacturer said.

'Pump Aid' Prevents Stuck Pumps

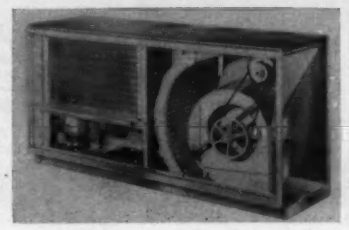
● The Garman Co., Dept. AH&RN, 1253 Grover Rd., St. Louis 23, Mo., announced that it is now distributing new, improved "Pump Aid" to dealers.

"Pump Aid is used to prevent stuck pumps over the usual winter shut down period," the company said. "It is injected into the pump housing after pump is drained.

"New Pump Aid provides a new rust inhibitor which vaporizes and prevents oxidation by atmospheric change, and controlled foaming action which prevents excess foam at start-up time.

"Pump Aid preserves seals, will not freeze or evaporate, and is water soluble, flushing away when pumps are started."

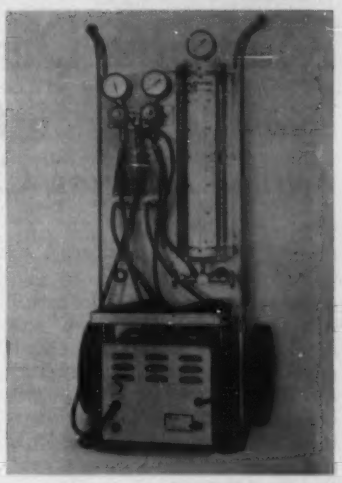
School Unit Adapted for Hydronics



● A new development in its line of school classroom heating, ventilating, and air conditioning equipment was announced by Lennox Industries, Inc., Dept. AH&RN, P. O. Box 1294, 1701 E. Euclid Ave., Des Moines, Iowa.

New air processing units with steam or hot water coils permit use of the "Comfort Curtain" system with a central steam or hot water heat source. Available in three colors with matching vinyl tops, these units are known as the DVS2-1200 for use with steam and the DVW2-1200 for use with hot water.

Dial Correct Charge For Auto Coolers



● The 10260 portable air conditioning evacuating and charging station has been introduced by the Vehicle Products Div., Robinair Mfg. Co., Dept. AH&RN, Montpelier, Ohio.

Universal for all automotive air conditioning systems, the station features a "Dial-a-Charge" cylinder that measures the correct amount of Refrigerant-12 to be used for each charging service operation, it was stated.

"The sight glass shield is simply 'dialed' to correspond with the pressure shown in the charging cylinder," the company said. "Charges with precise accuracy anywhere between 60° F. and 110° F., using Refrigerant-12.

"Complete components include all necessary gauges, fittings, high-pressure hoses, Dial-a-Charge cylinder, vacuum pump (that will pull in excess of most manufacturers' required 29 in. vacuum), welded brackets to accommodate a 25-lb. refrigerant drum.

"All components are mounted on a sturdy, portable cart with roller bearing wheels," the manufacturer stated.

Flexibility!

introducing the amazing new

TYPHOON SPLIT SYSTEM HEAT PUMP

ADAPTS TO ANY AIR DELIVERY PATTERN FOR HOME OR COMMERCIAL USE!

Here's flexibility to help you draw customers, close sales and build new profits for yourself. A true heat pump that operates without fumes, without flames, without water, the Typhoon air-to-air remote heat pump heats and cools in complete balance, complete efficiency. Easy to sell because it does so much to assure gentle even comfort all through the year. Yet it offers complete flexibility of installation in attics, basements, closets...wherever your customer needs or wants it!

Built with Typhoon's traditionally high standards of quality and engineering, offering easy installation through many variations of upflow, downflow, or horizontal air flow. Completely air cooled, oversize parts for Typhoon Power Reserve.

Send for full details on the flexible, fast selling Typhoon Split System Heat Pump. The competitively priced unit with more saleable features for home and business.

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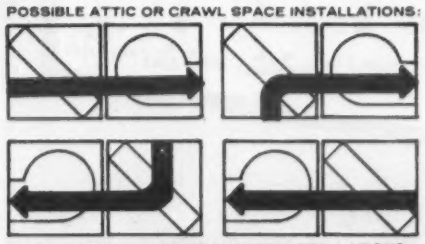
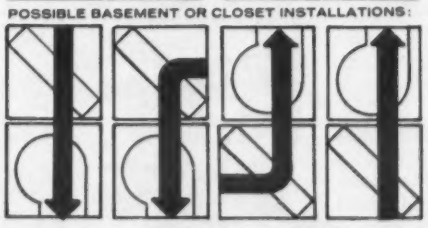


POSSIBLE BASEMENT OR CLOSET INSTALLATIONS:



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TYPHOON
DIVISION OF HUPP CORPORATION

Memphis Distributor Finds Heat Pump Can Be Sold In Small Towns

Dealer's Touring Demonstration Trailer Arouses Consumer Interest

MEMPHIS — Proof that central heat pump air conditioning systems can be promoted and sold in quantity in smaller cities and communities through the application of sound and intelligent sales and service tactics has been demonstrated in the operations of Woodson & Bozeman here, distributor for Fedders Corp. "Adaptomatic" central heat pumps.

The area covered by Woodson & Bozeman consists of the northern half of Mississippi, the western portion of Tennessee, and a few counties of Arkansas and Kentucky. Within a comparatively short time, the volume of heat pump sales has increased to the point where it now constitutes about three-quarters of the distributor's central residential air conditioning volume.

Big boost in the heat pump business came when the principals in the firm, E. D. Bozeman, Jr., president, and R. G. Bozeman, vice president, decided early last year to have Jim Leach specialize in sales of the "Adaptomatic" heat pump line. Business developed so well and so rapidly that a new representative was added and the territory has been split.

The principals in the firm feel that one key to their success has been a policy of making service that proper facilities for servicing the equipment will be maintained in any area where the "Adaptomatic" units are being sold.

DEMONSTRATION TRAILER that has helped sell 70 heat pumps in area around Oxford, Miss. poses in front of co-op headquarters where first unit was sold by accident.

Where the dealer is not equipped to handle service adequately, Woodson & Bozeman will step in and designate another firm to handle service in the area. Such a firm might be en-

A dealer who has done an outstanding job for Woodson & Bozeman is the Northeast Mississippi Electric Power Association in Oxford, Miss.

Dean Wolfe, co-op manager, ordered a heat pump for use in his own home and, in error, was shipped two units instead of one.

Rather than return the second, he sold it. Finding consumer interest high, he took on the Fedders line and has sold 70 more so far this year. Wolfe expects to sell 200 heat pumps next year.

Newspaper advertising has featured pictures of new homes that have just been completed, in which a heat pump was installed.

However, the "trump card" in the sales promotion effort has been a demonstration trailer which was the brain-child of a sales representative named Hewlett. Mounted on the trailer is a central heat pump unit, a 200-amp. service entrance panel and two small breaker panels which the co-op recommends be used with the 3-hp. units, and some samples of the ductwork system. Operating demonstrations can be held anywhere that 230-volt electricity is available.

Arrangements are made to show the heat pump in a particular place (usually at an electrical appliance dealer's store or at a new home project). After the trailer is set up and made ready for the demonstration, representatives drive around the area in the station wagon which halls the trailer and by means of a loud speaker, the public is informed when and where the demonstration is to take place.

Occasionally those attending will register for a small prize, which is presented at the end of the demonstration.

Another effective sales tool has been the use of a list of heat pump owners and their month-to-month electric bills. After the prospect is shown the list, he is invited to call on heat pump owners for a first-hand and unbiased opinion on operating results and costs.

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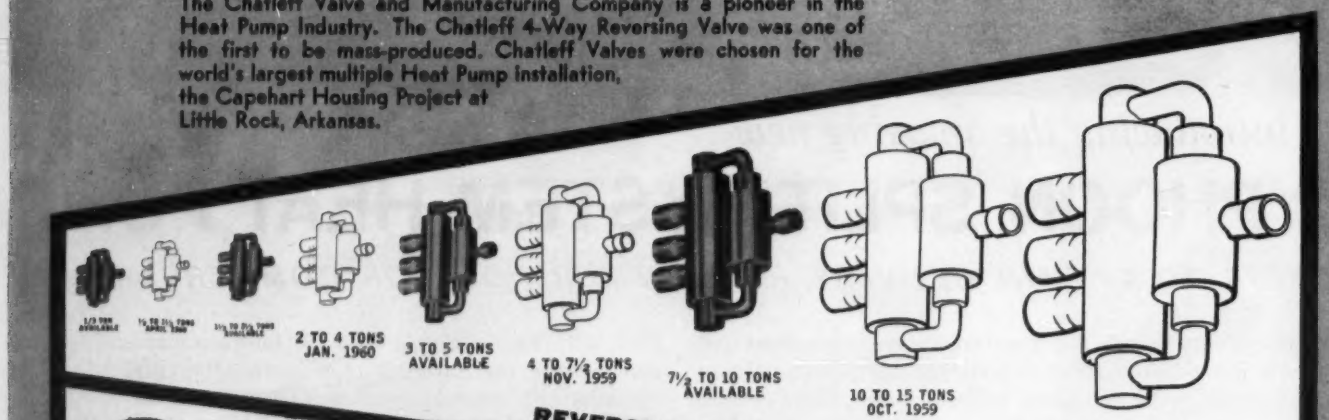
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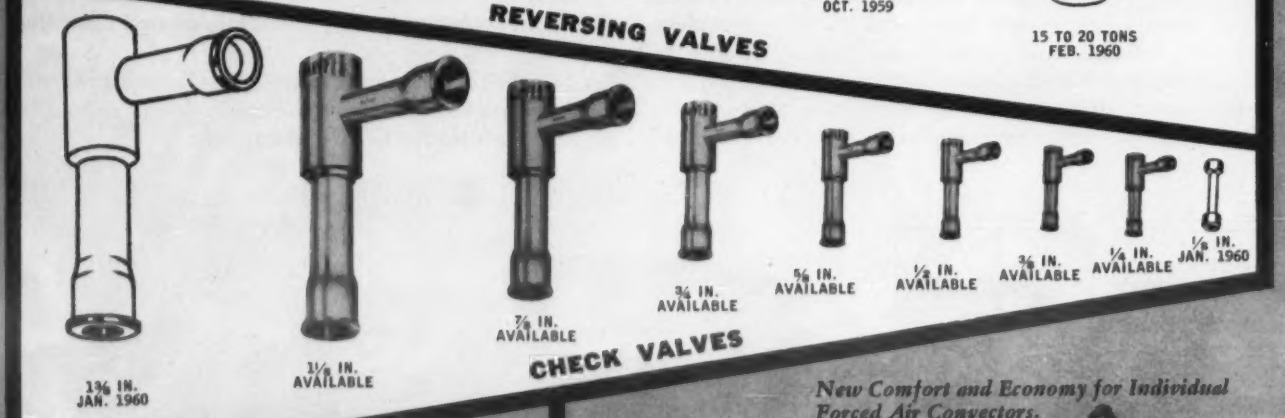

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Heat Pump Service Know-How Takes Shape

Problems Include Lack of Standardization of Units, Shortage of Information from Mfrs. And Little Experience on Part of Servicemen

Several manufacturers requested that in this special heat pump issue the NEWS conduct a service seminar in which servicemen would tell heat pump producers what they really think of their units. In discussions with service people about the country, ACH&RN found that no core of knowledge, no crystallization of reaction has yet taken place among them.

Talk heat pump service and you get "There is really no difference between heat pumps and cooling units," on one hand and "They are too complicated; the average serviceman doesn't know what to do when faced with one of these monsters," on the other hand. Asked for details, however, these same people faltered.

At this point, it seems that service people are prevented from having formed a definite reaction to heat pumps for several reasons:

1) lack of time—a great many contractors have handled heat pumps only a year or two. Very few have as much as three years of heat pump experience behind them.

2) too many design changes—as indicated in the Techcenter discussion of the state of the art, designers and manufacturers are still experimenting with techniques and components. "Changes are made without notice," complains one contractor. "And I mean *no notice*, either before or after the change. We find out about it only when we go on the job and find the alteration."

3) experience is limited to one or two manufacturers' products—similarity of products has not yet reached the sameness of most cooling units, so the serviceman cannot project his experience to other heat pumps as easily as in the case of cooling work.

As a result of these factors, service experience comes in isolated specifics.

One example: cooling people report a fan motor inoperative. replace it with a new one, then return it saying it also is inoperative. Actually, the defrost switch on the unit is inoperative and wiring is such that the fan will not run unless the defrost switch is functional.

Another example: high head pressures are normal for some heat pump designs. Confronted with these pressures, the heat pump neophyte takes all the standard corrective measures to reduce head pressure—without effect.

Defrost and its control stump a lot of people. Especially where resistance heat is wired in, all sorts of things can happen.

If controls are not functioning properly when the unit goes into a defrost cycle, the resistance heat may not come on; it may come on and stay on after the defrost cycle is completed, when it should disconnect.

The pattern of such specific problems, however, is not yet clear enough to make possible meaningful discussion of "heat pump service."

Service Record Breakdown on Heat Pumps

Service records kept on a new installation of 1,500 heat pumps on a military base since early this year show the following breakdown:

- **Leaks — 154**
- **Compressors — 143**
- **Reversing valves — 83**
- **Fans — 63**
- **Breakers — 56**
- **Capacitors — 51**
- **Thermostats — 47**
- **Motors — 41**
- **Relays — 38**
- **Bearings — 26**
- **Capillary tubes — 18**

Washington Water Power Co. Uses Heat Pump

SPOKANE, Wash.—A central water-to-water heat pump system of 815 tons' refrigerating capacity heats and cools a group of four buildings that comprise the Washington Water Power Co.'s central operating facilities here.

The facilities are a service building housing stores, a maintenance and repair garage, an auditorium-cafeteria, and a general office building.

The heat pump system, powered by 285-ton and 530-ton Trane centrifugal compressors, taps an underground river for its heat source. Water temperature ranges from 49 to 52° F. the year round.

While the system will provide 9 million B.t.u.h. for heating, an oil-fired boiler helps out when temperatures fall below 30° F.

Office building uses a high pressure dual duct air distribution system moving air at 4,500 f.p.m. against 7 in. static pressure.

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Compressors & the Heat Pump

Reliability, Performance Evaluated by Several Compressor Manufacturers

Outlining the heat pump compression discussion, **R. A. Gonzalez, manager of application and technical training, Airtemp,** comments, "The statement 'No compressor manufacturer has yet designed a compressor specifically for heat pump operation.' is certainly provocative. But it is an incomplete statement unless the critics proceed to tell us how and where the present compressor designs must be changed to suit the requirements of heat pump operation.

"This same cry is raised everytime a new application or variation of application is made, and there are varying degrees of validity to the charge, depending on circumstances," Gonzalez continues.

"For example, when compressor speeds were increased, it was found that some changes had to be made in the design of the valves and lubrication methods required to run 1,750 and 3,600 r.p.m. as compared to 400 r.p.m. Also, it has been reported that some manufacturers made compressor bodies only heavy enough for R-12 and had to make changes to use the compressor equipment for the higher pressures of R-22.

"Other manufacturers found no changes necessary because their compressor design had already incorporated bearing areas, casting thicknesses and the like based on ammonia practice and therefore suitable for R-22.

"Going a step further in the historical aspect, I do not know of any compressors that had to have major changes to join the trend to air-cooled operation. However, some compressor-motor units did need to incorporate more copper to handle the higher head pressures of air-cooled condensing.

Compares Heat Pump To Installation In Tropics

"The heat pump application generally considers use of a summer comfort air conditioning unit in winter as a source of heat, and we must consider compressor operating conditions in both seasons. In the tropical and semi-tropical areas, a heat pump operates on approximately the same conditions whether it is acting as a heat ejector or supplier. The same is true of a heat pump using water for summer condensing and for winter heat source.

"In these cases, the ratio of compression is in the same range for either duty, and it is difficult to see how any case could be made out for the need of compressor designs involving characteristics different than those used for normal air conditioning purposes," Gonzalez holds.

The situation is radically different in colder climates when air is used as the heat sink in summer and heat source in winter, he admits.

"When operating down to 0° outside air, for example, the compression ratio is considerably different than during summer duty. We can take, say, an evaporator at 37° and a 125° condensing temperature as a normal summer design situation. On R-22, this is

$$\frac{302.4}{80.4} = 3.76 \text{ compressor ratio.}$$

"On a typical winter operation, the evaporator could be at -15° with a 105° condensing temperature. Here we would have

$$\frac{227.7}{28.0} = 8.1 \text{ compression ratio.}$$

"This change in compression ratio is large enough to warrant some changes in valve lifts of most compressors for optimum operation. However, it is about the same change in ratio as experienced in such applications as shipboard work where equipment is frequently used to provide both the sub-zero temperatures required for transport of frozen products and alternately used to provide normal cold storage conditions."

Current Compressors Have Good Operating Characteristics

Gonzalez holds that the reliable compressors currently being manufactured have good operating characteristics over the range of compression ratios experienced in heat pump work, and there is no apparent need to expect major changes relative to pistons, cylinders, and valves.

Citing the successful application of standard compressors to heat pumps for as long as 30 years, the Airtemp manager stresses that most of these were field assembled and engineered.

He points out, however, that such field installations "have always required factory-type design engineering and the implementation of corrective measures and design modifications after some operating experience was obtained.

"The development of a heat pump unit in smaller sizes is definitely a factory problem requiring organized effort by an engineering department and laboratory testing facilities. While many components from standard air conditioning equipment may be used, modifications to starting equipment, controls, and other arrangements are a must.

"Summer air conditioners cannot readily be converted to heat pumps by a few modifications in the field," Gonzalez concludes.

This same point is pounded home by another major compressor manufacturer who

Editorial Profile

Talk to almost any manufacturer of heat pumps, to any of his distributors, to servicemen and you will encounter concern about compressors.

Repeatedly, the NEWS has been told that the greatest single problem in heat pump performance, especially in regards to reliability, is the compressor; this component has been said to have the highest rate of failure of the several major items in the package. One opinion: on heating duty—when lowest suction pressures occur—electrical discharges take place burning out the motor.

Compressor manufacturers rebut that over-all design of the entire heat pump system is the controlling factor in heat pump performance. "The compressor can't be expected to compensate for poor control systems, improper valving, unbalanced line sizes and restrictions," is the way one puts it.

Reliability and failure rates aside, much compressor discussion concerns itself with relative efficiencies of the compressor on heating and cooling operation. Essentially, the heat pump compressor must have a high volumetric efficiency to prevent excessive loss of capacity at low ambients. General approaches to increasing the displacement of the compressor at low ambients would be: stepping up the speed of the compressor on heating; employing another cylinder in the compressor which has been unloaded at temperatures above the balance point; bringing another compressor into play in a multi-stage arrangement.

Both cylinder unloading and two-speed compressors have been field tested by major manufacturers—with unhappy results. The use of centrifugal compressors for heat pumps is limited to large industrial and commercial installations.

On the whole, compressor manufacturers have adapted existing cooling compressors to heat pump use, although at least one manufacturer is now advertising a compressor "to meet the specific conditions imposed on heat pump applications," and others are definitely working on new designs for heat pump use.

In the meantime, however, heat pump manufacturers and installing/service contractors insist "No one has yet designed a compressor specifically for heat pump application," and the NEWS asked major compressor manufacturers to comment.

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"... and I'll buy a General Electric starter for *all* of my commercial air conditioning installations. Why? Because the new 50- and 60-amp contactors and starters give me the two things I want most in a starter: small size and ruggedness.

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chooses to remain anonymous but states "The heat pump should be designed for the compressor." This is especially pertinent, he feels, when it is considered that most heat pumps, so far, are moving into milder climates where the unit is operating on cooling most of the time anyway.

Discussing the point of compressor reliability, this same authority creates two categories for consideration: first, *operating time* and second, *operating conditions.*

Heat Pump Compressors Get 3-4 Years Wear In Just 1 Year

"In one calendar year, a heat pump gets from 3 to 4 years' running time compared to a straight cooling unit," he points out, "but I don't feel that this is a major problem by itself. There are many industrial jobs to which our straight cooling units are applied with the same compressors as the heat pump uses, and on which operating hours are equal to and greater than those for the heat pump. According to our mortality records covering the period since 1947, compressor life has not yet been reached."

This source is far more concerned with operating conditions as they affect compressor reliability — especially on the heating cycle at low outdoor ambients.

As he defines the problem, "With outdoor ambients in the vicinity of 15° and below, the compressor pumping rate is reduced, the outdoor coil gas velocities are very low, and the low temperatures in the outdoor coil tend to make oil congeal. When a compressor operates for a prolonged time at these conditions, it is possible to damage a compressor due either to lack of motor cooling or loss of oil from the crankcase.

"In addition, these operating conditions seem to accentuate electrical and other mechanical faults. Further, in some areas low voltage often occurs during extremely cold spells."

Discussing coefficient of performance under cold ambients, he states, "It is interesting and significant to note that during cold spells the effective COP (which must be taken into consideration defrost cycles and booster heat in any 24-hour period) approaches 1. At this point it is possible to get close to the same heating efficiency with straight resistance heat as with the compressor.

"One or two manufacturers are already doing this, cutting off the compressor at say 20° or lower and substituting resistance heat for it. This may be one of the big answers to the compressor reliability question."

Redesigned Compressor Would Rob Heat Pump Of Competitive Pricing

Agreeing with Gonzalez of Airtemp, this authority predicts **"It is unlikely that heat pump reliability will be improved in the near future by a compressor redesign that can be built at a cost which will leave the heat pump in the price range the average homeowner can afford."**

As indicated in the Editorial Profile of this discussion, some companies are considering redesign to meet some of the specifications being insisted upon by heat pump manufacturers. One of the companies which seems ready to announce a special heat pump compressor told the NEWS only a short while ago "We know of no shortcomings our present compressors have, from a reliability standpoint, over any new design compressor we might produce."

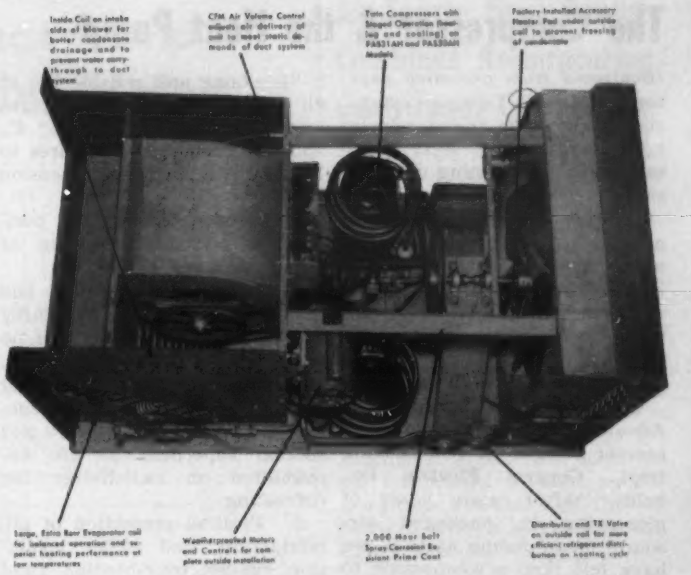
"The problem of selecting or evaluating a compressor is difficult since workmanship and care in assembly and running-in will generally have more influence on its life than general design features," offers one authority, who suggests that if capacity control is needed, it is better to use two single-speed compressors than one two-speed machine.

Commenting on the general subject of "special design for heat pumps," **R. A. Preston, chief design engineer of Tecumseh,** warns against the "gadgetry" approach to increasing effective displacement of the compressor during the heating cycle. According to Preston, "There is no data which would indicate that present design compressors lack reliability for year-round use on heat pump applications."

Supporting the prime contention of Preston, **Glenn E. Detrick, service manager of Copeland,** feels that we may be playing with words. "While admittedly there have been no original compressors designed primarily for heat pumps, we—and others—have been working with heat pump manufacturers for years in strengthening points of stress or strain, points of design which seemed peculiarly significant to heat pump operation.

"None of these changes has affected the basic design of

(Continued on next page)


Inside Coil on intake side of blower for better condensate drainage and to prevent water carry-through to duct system
CFM Air Volume Control adjusts air delivery of unit to meet static demands of duct system
Tote Compressors with Staged Operation (heating and cooling) on PA531AH and PA530AH Models
Factory Installed Accessory Heater Pad under outside coil to prevent freezing of condensate
Large, Extra Row Evaporator coil for balanced operation and superior heating performance at low temperatures
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2,000 Hour Salt Spray Corrosion Resistant Prime Coat
Distributor and TX Valve on outside coil for more efficient refrigerant distribution on heating cycle

A VIEW of a twin-compressor heat pump showing design features which are considered in a "fully engineered unit."—Perfection Industries.

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The Compressor & the Heat Pump--

(Continued from preceding page)

compressors," Detrick emphasizes, "and from the standpoint of appearance they seem identical to air conditioning compressors.

"Naturally, we do not close our minds on problems of this sort," he continues, "and we will continue to do a considerable amount of research work which may result in a newly designed compressor for heat pump applications."

C. A. Dubberley, manager of Advance Engineering and Compressor Design, Air Conditioning Dept., General Electric Co., holds, "After many years of pioneering in packaged air-source heat pumps at G-E, we have felt that a compressor to serve this application should have at least the following characteristics:

"1. **Long and reliable life** at all refrigerant temperatures from about −30° to +55° F., and condensing temperatures to 150° F. with particular attention to:

a. Good tolerance for periodic or continued flooding of liquid refrigerant.

b. Non-critical bearing and lubrication system to carry through transient periods of no oil in the compressor sump, etc.

c. Over-all tolerance to rapid and extreme transients of suction pressure, head pressure and suction superheat as are encountered on switch-over for defrosting.

d. Positive protection of oil, refrigerant, and motor insulation against over-heating (and resultant breakdown) at high pressure ratio and high superheat.

"2. **Good capacity and economy** over the −30° to +55° range of refrigerant temperature. (This requires very low clearance volume but with extra large port areas. If this is met, capacity modulation is undesirable and unnecessary.)

"3. Good **heating** performance as well as good **refrigerating** performance. (This requires maximizing the heat delivered to the condenser with minimum heat rejection from compressor shell.)

"With these criteria and others in mind we set out in 1953 to develop a line of hermetic compressors to serve the residential and light commercial heat pump market together with the cooling equipment market. Today's products indicate the criteria were well chosen and that properly prescribed design considerations are imperative when engineering a compressor for high performance heat pump operation."

York Corp. states flatly that the statement that no compressor manufacturer has yet designed a compressor specifically for heat pumps indicates "a lack of understanding of heat pumps and their components."

Claiming to have installed "more tonnage of industrial air-source heat pumps than all the rest of the industry combined," York holds that the demands on its compressors in central station air-source heat pumps are basically the same as on a conventional refrigeration installation. "Records indicate that compression ratios required of compressors on heat pump duty is generally less than for a cold storage plant—and a cold storage plant operates all year around.

"At one time it was true that heat pump operation made demands that exceeded the stamina of many compressors. Some still do not measure up to the job," York opines. "But a heat pump is simply another means of air conditioning. Automatically operated valves that reverse the flow constitute the principal difference."

The company cites test data and field experience indicating long life expectancy for its compressors — including the standard 1 and 2-hp. units used on packaged heat pumps and air conditioners. These tests included operating the compressors packed in ice and at extremely hot temperatures.

"York manufactures the entire heat pump—from 1 to more than 1,000 tons—and tailors all components to the jobs they must perform.

"While York compressors are not designed *exclusively* for heat pump use, they are designed to stand up under increased operating hours and range of heat pump and refrigeration application," the company concludes.

The relationship between low temperature refrigeration and heat pump performance is emphasized by **George W. Hartwell, chief engineer, Brunner,** who states that "We have had very good success with heat pump applications largely because our compressors were basically designed for low temperature operation.

"Although they are suitable for air conditioning work, they are basically designed to take the higher pressure differentials that occur on low temperature applications," Hartwell explains. "For low temperature application only, a reduction in the size of the motor used in the compressor is made.

"For heat pump application, a motor suitable for air conditioning temperatures must be provided, and in such applications there is a slightly larger motor than is required on the heating cycle.

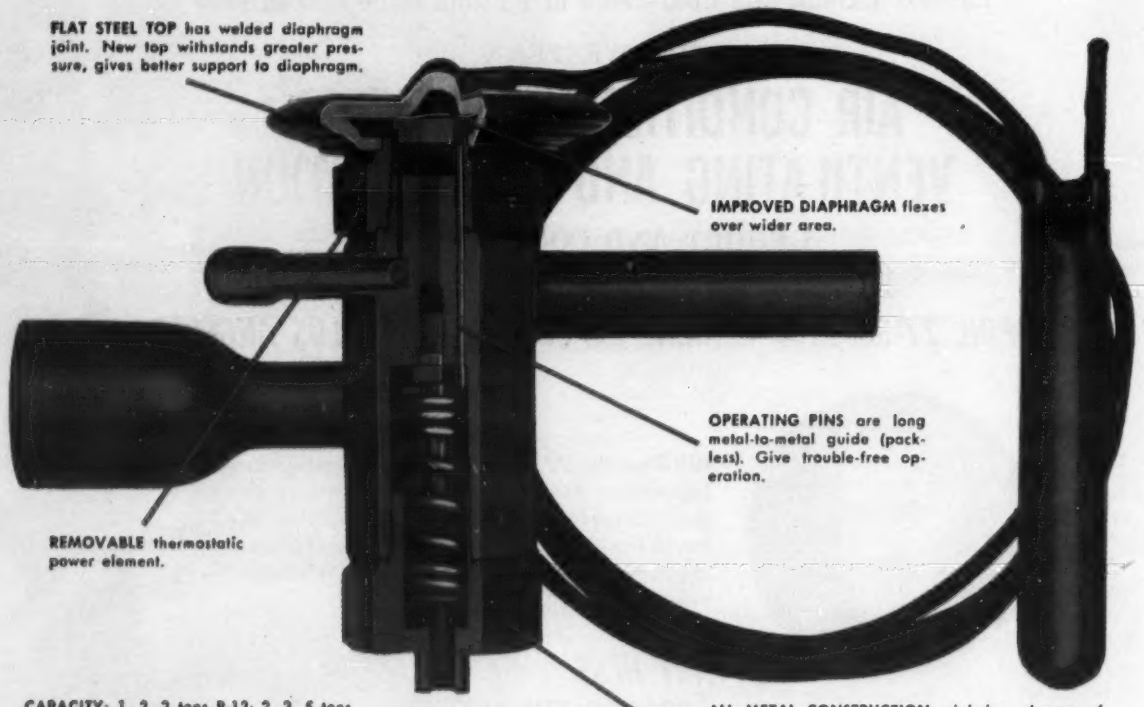
"The low pressure which is encountered on the suction side of the system during the heating cycle reduces the horsepower required even though there is a greater load on the bearings due to the extremely high differential pressure from low side to high side. The extra horsepower adds about 10° to the superheat of the gas being pumped by the compressor.

"In spite of this extra superheat entering the compressor, discharge temperatures can be maintained at a reasonable level as the condensers on the heating cycle are normally sized to a 120° condensing temperature. At this condensing temperature, the discharge temperature will not exceed 250° which we feel is the safe discharge operating temperature."

M. V. Griffin, Product Service Dept., Unitary Equipment Div., Carrier Corp., emphasizes, "In terms of reliability and performance, the Carrier compressors are 'right' for heat pumps. To turn the question around, we do not know of any design changes that could be made to improve their heat pump performance or reliability.

"The Carrier 6D serviceable hermetic compressors used in heat pumps were specifically designed for continuous operation at high efficiency throughout a wide range of refrigeration and air conditioning operating conditions that are actually more

Withstands over 100,000 life cycles of extreme pressure fluctuations in heat/cooling changeover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CAPACITY: 1, 2, 3 tons R-12; 2, 3, 5 tons R-22. Adjustable superheat. External equalizer. Standard liquid charge or pressure limiting gas types are available.
ALL METAL CONSTRUCTION minimizes danger of damaging valve when soldering into line (valve does not have to be disassembled) and eliminates possibility of external leaks due to refrigerant reaction with gaskets at high temperatures encountered on heat pump applications.

New (A-P) model 214 "flat-top" thermostatic expansion valve

There was a time (before heat pumps came into general use) when refrigeration valves were never required to withstand the shock of extreme reverse-pressure differences across the diaphragm.

Enter the heat pump and new problems. When this type of system calls for heat or cooling *opposite* to the way it was last operating, the inlet and outlet sides of both valves are immediately reversed. This sudden withdrawal of high pressure on the outlet side, coupled with high thermal bulb pressure puts tremendous strain on the diaphragm. Result: Thermostatic expansion valves were failing after only 7000 life cycles.

A-P engineers went to work on the problem and solved it with the "flat-top" Model 214 thermostatic expansion valve. Check the improvements shown on the cutaway view. These features enable the new "flat-top" to withstand over *1,000,000* normal life cycles and over *100,000* life cycles of extreme pressure fluctuations incurred during heat pump reversals.

The new Model 214 is typical of Controls Company of America's ability to keep pace with the industry. It's part of industry's most complete line of refrigeration and air conditioning controls. Write today for bulletin containing complete details.

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severe than those occurring with a heat pump.

"But no compressor, however well designed and manufactured, will work well in an improperly designed system. Due to our long experience in the refrigeration field, and with heat pump applications dating back for more than 20 years, we are naturally aware of system design practices necessary to prevent operating conditions that would damage the compressor.

"We have no reason to believe that our experience differs from that of other segments of the industry," Griffin continues. "If the charge of improper heat pump compressor design is valid at all, it must relate to a small segment of the industry without experience in the fied."

Commenting on the electrical discharge theory mentioned in the Editorial Profile, Griffin feels there is a misconception on the part of those who hold to this theory.

"When pulling vacuums measured in microns with a special vacuum pump, ionization may take place if power is applied to the compressor; the windings may arc over and the compressor may burn out. This has happened to various people and is probably the reason behind this misconception. It takes extremely high vacuums in order to get into the ionization range for refrigerants; vacuums which refrigeration compressors cannot attain by themselves, so there should be no danger of this under operating conditions."

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Heart of Heat Pump— The Reversing Valve

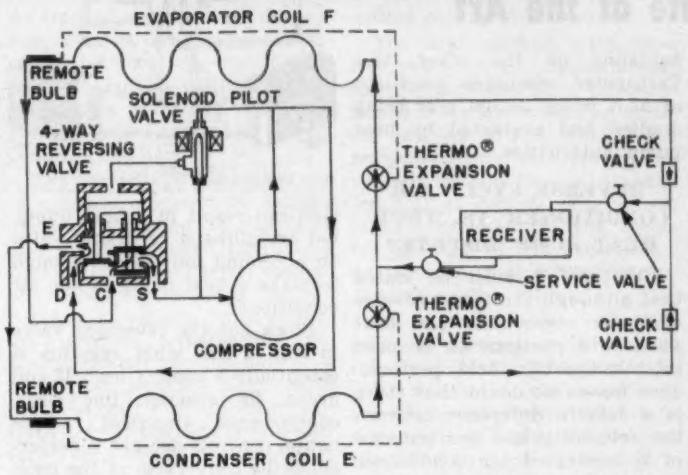
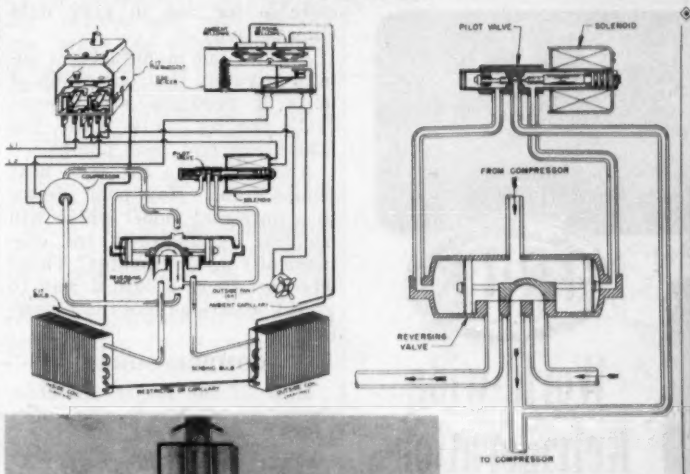


FIG. 1—Two concepts of reversing valves in action. Upper diagram is Alco; lower diagrams are Ranco.



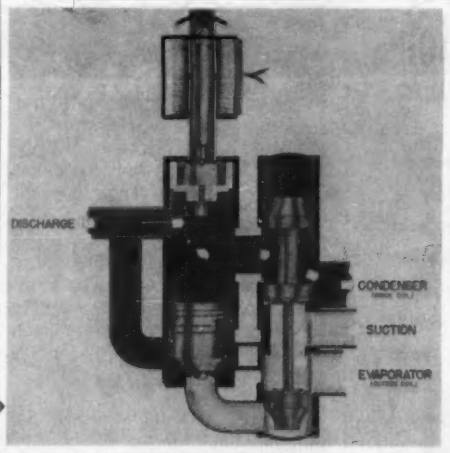


FIG. 2—View of Chatleff reversing valve in heating position.

The reversing or changeover valve is the heart of the heat pump. Through the action of solenoids and the pressure differentials existing in a refrigeration system, the reversing valve changes the direction of refrigerant flow (except through the compressor) and makes the condenser an evaporator and vice versa, when the cycle is reversed.

Presently Ranco, Alco, and Chatleff are the major suppliers of reversing valves used by most heat pump producers. Sporlan Valve Co. is reported to be field testing its design, and Minneapolis-Honeywell is said to be ready with a new changeover valve.

Heat pump producers generally acknowledge their indebtedness to the control people for the present state of development of heat pumps; Ranco, especially, is singled out for consultation and testing of many units.

Together with the heating-cooling thermostat and the defrost controls, the reversing valve must be incorporated into a total design which considers pipe sizes, wiring, coil circuits. For the most part, heat pump makers follow the advice of the reversing valve suppliers as to location (must be kept warm as possible to prevent congealing of the oil and subsequent sluggish action) and position (horizontal, vertical).

Air-Source Heat Pump Combines Reciprocating, Centrifugal Compressor

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Actually the store employs two identical systems with 280-ton centrifugal and 130-ton reciprocal compressors in each.

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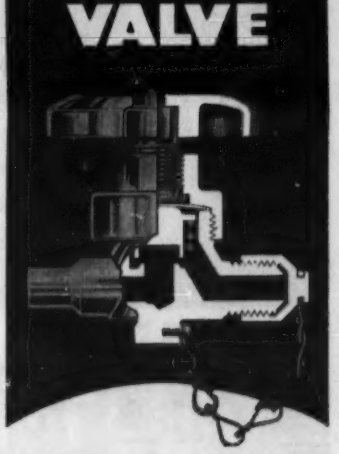

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TECHNICAL CENTER

By Frank J. Versagi, Technical Editor

Heat Pump: The State of the Art

This discussion is limited to air-to-air heat pumps. Ground-source units never really got off the ground; they are already discounted for all but unique applications. Water-source heat pumps, admittedly the most efficient of packaged equipment, cannot achieve the universal distribution which producers are seeking for reasons discussed elsewhere in this issue.

It is the performance of the air-to-air unit, split and self-contained, which will determine the extent to which heat pumps penetrate the heating-cooling market.

Ignoring promotional claims on the one side and competitive belittling on the other, this Techcenter discusses questions of heat pump design now being studied and evaluated by heat pump authorities.

'REVERSE CYCLE AIR CONDITIONER' VS. 'TRUE HEAT PUMP' DISPUTE?

Right off it must be stated that although the terms *reverse cycle air conditioner* and *heat pump* will continue to be used interchangeably, field performance leaves no doubt that there is a definite difference between the reliability and performance of a converted air conditioner and a fully designed heat pump. True, a well engineered conversion can result in a heat pump, but installing a reversing valve on a cooling unit is not enough to make a heat pump of the air conditioner.

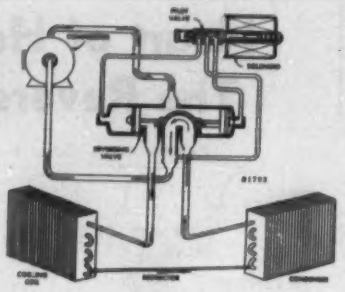


FIGURE 1.

Block out the reversing valve in Fig. 1 and what remains is essentially a cooling unit. If coil areas, fin spacing, line sizes, compressors, electrical components, controls are not considered in the conversion of the cooling unit, the result is a reverse cycle air conditioner which is suitable for use in very mild climates only.

At least one manufacturer admits privately that one group of units it produces are reverse cycle cooling units while the others are real heat pumps.

And where do the true heat pumps stand? How near are we to a universal model which will perform satisfactorily and economically in all climates? Those who feel there is still a way to go ask questions like the following.

COMPRESSORS?

Most of the major manufacturers of compressors give their answers to this question on another page in this issue. As many point out, however, improved compressors alone do not make a heat pump efficient and economical for universal application. One point which bears repeating here is that correct balance between heating and cooling must be designed into the unit to prevent overloading the motor-compressor. The compressor must be able to operate at both high and low suction pressures.

COIL DESIGN?

When a heat pump is operating on the heating cycle, the outside coil, normally the condenser, becomes an evaporator. IT MUST BE TREATED AS AN EVAPORATOR — a point which some designs ignore. Thought must be given to increasing its effective area. The effect of fin spacing on the speed of ice formation and its subsequent removal should be considered. (To get prosaic, a fan can blow water off widely spaced fins much more readily than from closely spaced fins. Frost formation is less, both in amount and rate, on wide-spaced fins.)

Circuiting must be taken into account in both coils—pressure drop and oil return and matching with the compressor. Total design must include decision for bottom or top feeding of coils, the possible use of multivertical passes with distributors and transfer bends.

Since the heat pump operates with the same refrigerant charge on heating and cooling, thought must be given to accumulation and storage to prevent flood-back or ice formation on the compressor during the heating cycle.

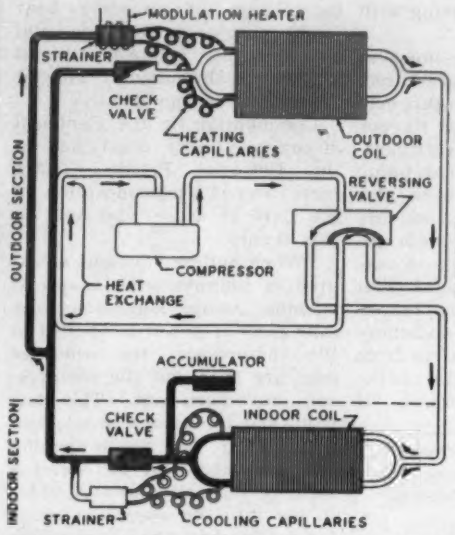


FIG. 2—One manufacturer's concept of a true heat pump as differentiated from a reverse cycle air conditioner.

Check valves, crankcase heaters, modulation heaters, accumulators, heating exchangers are all being used, sometimes in combination to solve the problem of flood-back during changeover from one cycle to the other —a factor most important in areas where the heat pump may defrost several times a day.

REVERSING VALVES?

The heat pump as it exists could not be possible without the present reversing valves which are discussed in another place. Yet, some feel an entirely new concept in changeover valves is needed.

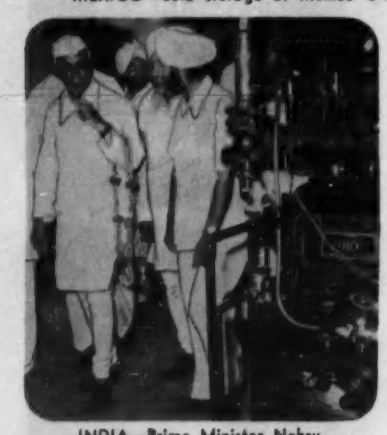
With the present models, most discussion is over their location and position. Service calls due to reversing valves are high, as indicated by the distributors and dealers interviewed for this issue, but many times the correction is merely a tap with the hammer.

Although Westinghouse has chosen to build and install its own reversing valve, the rest of the manufacturers seem resigned to the fact that any improvements in this item will have to come from the present controls people.

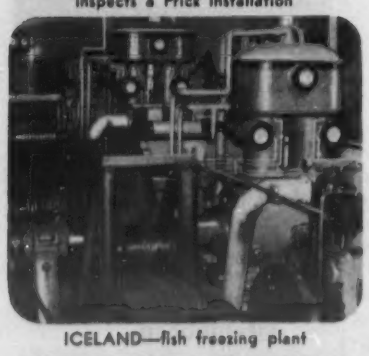
EXPANSION VALVE OR CAP TUBE?

While smaller units are operating with a single capillary, it is more usual for a cap tube heat pump to have two capillaries—one each for heating and cooling. According to some designers, unit balance can be obtained with two cap tubes and a restrictor selector valve. These authorities feel that with the proper selection of the heating capillary, maximum heating output can be obtained at the low-

MEXICO—cold storage at Mexico City



INDIA—Prime Minister Nehru inspects a Frick installation



ICELAND—fish freezing plant

SPAIN—packing house in Madrid

AFRICA—Heavy-duty and "ECLIPSE" compressors at Cape Town

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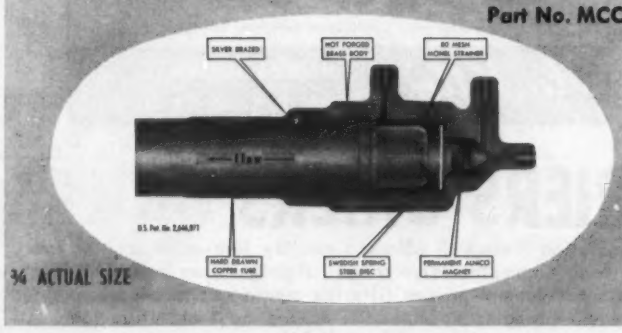

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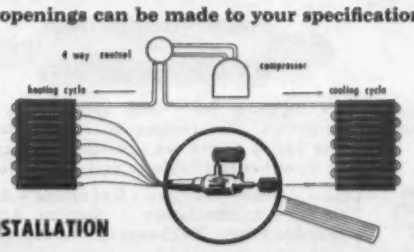

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est ambient at which the unit is intended to operate, without overloading at higher ambients.

There are other designers who insist that a different cap tube is needed for each 10° change in ambient, a theory which would make it necessary to have multiple capillaries in units designed for the North, with solenoids switching from one capillary to another as required—an obviously uneconomical approach.

Still others favor thermostatic expansion valves over capillaries, and at least one major producer of heat pumps has converted to expansion valves after a couple thousand sales with cap jobs. Until very recently, however, units with expansion valves were starving the coils when ambients dropped below about 17°. A newly-developed valve promises to correct this condition by keeping the coil partially flooded below 17°, yet will not flood the compressor.

Expansion valves take quite a beating in heat pump service. They must take pressure as high as 350 p.s.i. without rupturing; they must stay open at pressures down to 40 p.s.i. They are slammed with terrific pressures when changeovers take place. There is a strong possibility that one type expansion valve may be needed in the North, another in the South.

METHOD OF DEFROST?

There are three methods of defrost in common use on heat pumps; this statement excludes head pressure-actuated water defrost which is suitable only in very mild climates and the direct electric defrost so far used by one company alone.

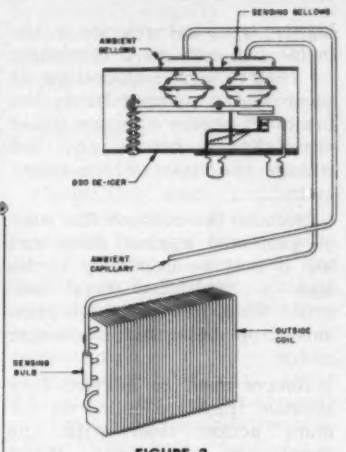

FIGURE 3.

The first method of the common three uses two temperature sensing elements—one to measure outside ambient, the other to measure outside coil temperature. (Fig. 3) The switch operates on a temperature difference between the two elements. As frost accumulates on the outside coil, the temperature differential between the outside air and the outside coil increases. When this difference reaches a predetermined value, the defrost control functions.

The second method makes use of a single temperature sensing element, mounted on the coil, and a time clock. Defrost is time-actuated and is terminated when the refrigerant in the coil reaches a certain temperature. To prevent unnecessary defrosts, the defrost thermostat is so wired that the time clock contacts will automatically initiate defrost only if the coil surface temperature is simultaneously below the setting of the thermostat. While there is frost on the outside coil, the condensing temperature will remain low; when the condensing temperature rises sharply because defrost is completed, the rise breaks the thermostat contact, terminating the defrost cycle.

The third method of defrost makes use of an air pressure differential switch.

Here the defrost mechanism reacts to the change in air pressure drop across the outside coil. As frost builds up, the increase in pressure drop initiates defrost at a predetermined setting.

Difficulties have been encountered with all three methods. As pointed out in the distributor/dealer discussion of heat pumps, defrost problems are first on the list of field difficulties calling for service.

The first method, sometimes referred to as the cross-ambient method, is based on a predetermined spread between the ambient and the outside coil. As the ambient drops, this spread decreases leaving less of a range for defrost control. The spread is also affected by the inside temperature of the structure—an increase in this temperature decreasing the spread.

On the time clock/coil temperature method, it is possible for the contacts to call for defrost when the coil reaches a low enough temperature due to low ambient—whether or not frost has built up on the coil.

Frost or dirt in the control has rendered inoperative the air pressure switch type of defrost. Gusts of wind have called for unnecessary defrost cycles by creating a pressure differential not caused by frost build-up. The method is not applicable to units which operate with very low coil air pressure drops.

SHOULD FANS CONTINUE TO OPERATE DURING DEFROST?

The question has relevance both because its answer affects operating cost and affects total design and control circuitry. This problem is handled in several ways.

Where resistance heat is available, some manufacturers wire the units so that the heaters come on while the unit is defrosting. The fans blow tempered air into the structure.

Others stop all indoor air movement while the unit is defrosting. And a few allow the

(Concluded on next page)

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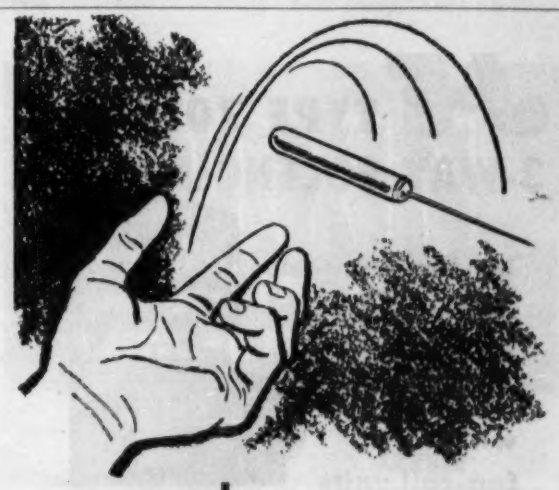

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(Concluded from preceding page)

unit to blow cold air into the structure during the time the inside coil is an evaporator.

Time for defrost varies from as little as 1½ minutes to over 6 minutes on various units.

SUPPLEMENTAL HEAT?

The need for supplemental resistance heat and the subsequent operating cost are factors which weigh heavily in the decision to go heat pump or not. Indeed, there are those who feel heat pumps will never achieve universal acceptance until the need for supplemental heat has been eliminated or at least drastically reduced.

As it stands, resistance heat is supplied in strips or steps which can be made to come on one at a time as needed. As the outdoor temperature decreases, the heating output of the refrigeration cycle also decreases, and controls are usually set to call for the first step of resistance heat when outside ambient reaches the design balance point.

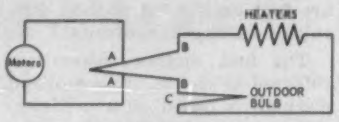

FIGURE 4.

The basic control for heat pumps with resistance heat (Fig. 4) requires the use of a two-step thermostat and at least one outdoor thermostat. Contacts A and B compose the indoor thermostat which is manually set. Contact A controls the heat pump motors, and it must be closed before B can close. Contact C is controlled by the outdoor stat. The outdoor bulb is set to operate at the balance point, and this keeps the resistance heat off except when needed.

In practice, some control systems are such that if the occupants practice night setback, the unit is fooled into thinking resistance heat is needed when the thermostat is raised again in the morning. Some suggest a positive lockout of resistance heat until some definite outside temperature is reached.

The use of individual resistance heaters in the several rooms is being increasingly favored by many, both as a money saver and as a practical method of zone control. In such a system, the central unit has no strip heaters; individual room heaters, controlled either manually or thermostatically, supply supplemental heat where and when needed.

AS AMBIENT DROPS

As the outside ambient drops, the COP of an air-to-air heat pump also drops until it reaches 1 at temperatures from about 20° to a claimed -20° of some producers. At this COP, the compression unit is operating at no greater efficiency than straight resistance heat, delivering about 3,415 B.t.u./kw.

With this in mind, some producers will allow the unit to operate on reverse cycle down to a determined outside ambient, at which point a thermal bulb located in the outside air stream cuts off the compressor. Others allow their units to keep running at these low COP's, their reasoning being that all the heat available should be utilized. Most who cut the compressor out do so because they fear harmful effects on the compressor at the conditions present at there low ambients and COP's.

ELECTRICAL COMPONENTS

While it is true that the average heat pump draws less amps on heating than on cooling, there are several considerations which make it necessary to beef up or alter electrical components.

The evaporator fan motor, for example, is subjected to much higher temperatures when the inside coil acts as a condenser on reserve cycle. Operating at these higher temperatures, the fan must have a stronger motor especially to handle any low voltage conditions which might arise.

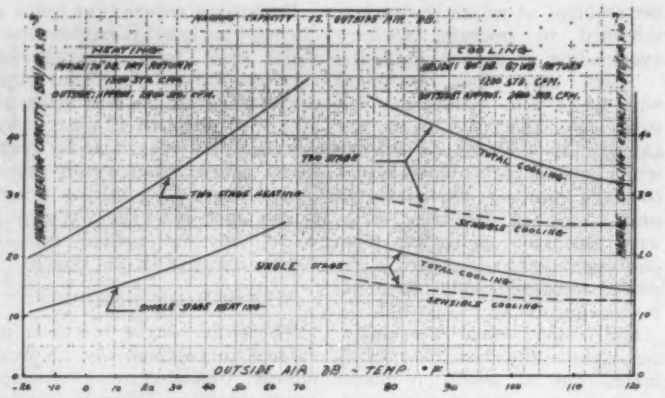

FIG. 5—Typical performance curve of a heat pump, showing reduction in capacity as ambient drops. Curve shows machine capacity for a two-stage unit.

Because the outdoor fan must be protected against snow and ice, it may be necessary to design a protective hood and grille. These create a high pressure drop and call for a larger motor.

Relays must be heavier duty because they are called on for more action than with the usual air conditioner. When such components as defrost thermostats, heating-cooling thermostats are added, more amps will be drawn on the control circuit, and a higher capacity transformer is necessary.

If a permanent split capacitor unit of more than 1½ hp. is to be converted, a larger overload protector, a new relay, a starting capacitor are called for.

Some utilities frown upon the use of single phase equipment at the 5-hp. range, and there may be future difficulties with the newer utilization voltages coming into use. (A thorough discussion of power distribution, voltages, motors, will appear in future Techcenters.)

Phases of heat pump design such as those discussed in this article are presently being studied by design engineers. With few exceptions, these engineers feel the state of the art is considerably short of the stature it must reach before mass produced heat pumps are universally applicable in all climates.

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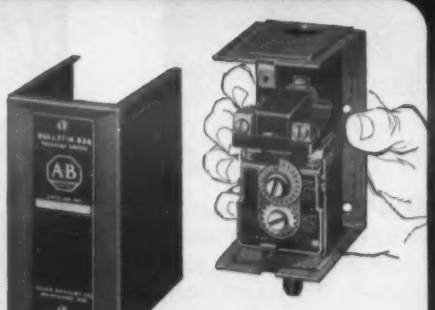

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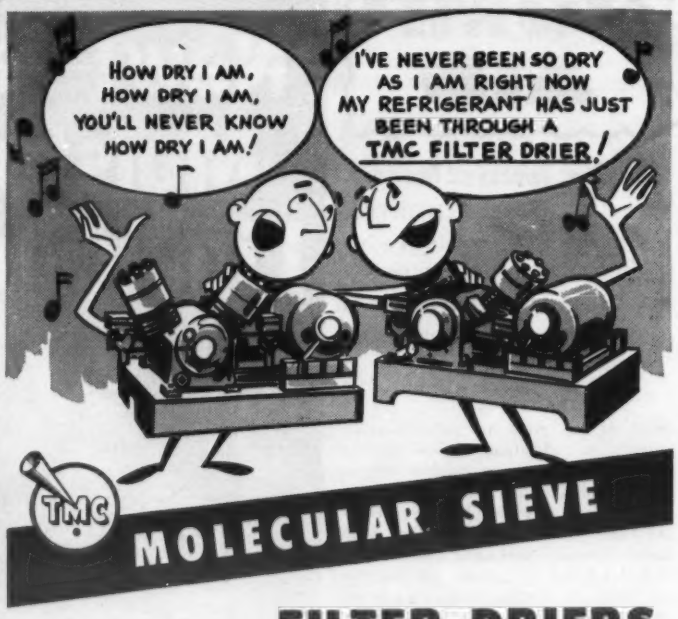
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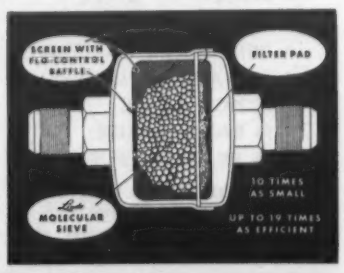

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Heat Pump Must Penetrate Midwest--

(Concluded from Page 1, Col. 5)

Asked by the NEWS to estimate how many heat pumps can be sold to this potential market in 1960, manufacturers predicted as few as 10,000, as many as 50,000. There is even more variation in their estimates of the commercial market—the low guess being 4,000, the high figure 75,000. Average judgments are 29,000 and 19,000, respectively.

To take a large segment of this potential residential market, the heat pump will have to penetrate in volume the heavily populated Midwest and other areas not favored by the mild weather characteristic of Florida and southern California. At this point, when the "geographical factor" is brought up, heat pump proponents part company on the question of the ability of present equipment reliably and economically to accomplish this objective.

While utility rates also bear on the question, information from all phases of the industry makes it quite clear that there is a hard core of hesitation about pushing present designs in colder climates. The disagreement is best exemplified by the fact that at least two major manufacturers, with sufficient productive capacity and sales distribution to match any, have chosen to move slowly in their promotion and sales.

One of these companies is almost ready to add to its line a heat pump, tentatively called "Yankee," for use in the North.

Companies with hesitations about heat pumps are normally reluctant to voice these hesitations publicly, because the doubts can be misinterpreted as a lack of confidence in their own equipment compared to that of competitors.

"Although the heat pump market is becoming increasingly attractive," offers a relative latecomer to the field, "we feel it is vital that the growth of the heat pump be orderly—with equipment properly designed for the area in which it will be used and with a realistic appreciation of inherent limitations of present equipment."

The orderly growth idea is advocated by many who are slightly fearful that the present surge of heat pump sales may come to a sharp halt as has happened on a smaller scale in a few cities when experience with installed units has lessened enthusiasm for theb.

The growing number of heat pump producers is another point of contention when the market is evaluated. "There are too many," some insist. "There has to be a shakedown."

"I predict there will be more than 100 heat pump producers before long," predict others, "and this will be a good thing for the industry."

How 25 companies have shared heat pump sales to date is shown in the tabulation on page 32.

During the months of preparation for this issue, it was the unusual interview which did not get around to rumors about military installations. "Hundreds of compressors failed." "Capacity is so low that occupants must leave the house at temperatures about 30°," are examples of such rumors presently circulating through the industry.

Military Experience Is of Paramount Importance

Although the most persistent talk is about Little Rock Air Force Base (see page 28), it is significant that such rumors are not restricted to any one manufacturer. The NEWS has followed up reports of mass failures of all major manufacturers' equipment to find the reports grossly exaggerated, though most often based on a kernel of truth—some compressor burnouts, a few strip heater relay failures, relatively numerous malfunctions of fan relays are examples of what were found.

Military use of heat pumps is of paramount importance to the industry, not only because government purchases are many, but also because the military is accurately studying operating and maintenance costs. Housing on each base contains some metered installations; service and maintenance records are being scrupulously kept.

If, as a result of these studies, the Military reports favorably on the economy of heat pump conditioning, the promotional effect for the industry will be invaluable.

* * *

Literally hundreds of persons contributed to the information contained in this special heat pump issue. Knowledge and opinion from every segment of the industry are included. It will become obvious to the reader that much of the discussion is ultimately technical in nature. This was inevitable, since it is precisely the technical, the engineering, the design considerations which are uppermost in the minds of heat pump authorities at this time.

Subsequent issues of the NEWS will carry further stories and articles based on data gathered during the research for this special report.

G-E Promotes Von Behren

NEW YORK CITY — Promotion of William P. von Behren to general manager of the Major Appliance Div. was announced recently by General Electric Co.

His appointment was part of a series of executive shifts that moved Charles K. Rieger, former general manager of the division, up to vice president of marketing services.

Von Behren was formerly general manager of the radio receiver department.

In other moves, Fred J. Borch, who formerly held the post now filled by Rieger, was promoted to vice president and group executive of General Electric's consumer products group.

He succeeds James H. Goss, who was named vice president and group executive of a newly-formed international group to which International General Electric Co. Div. has been assigned. Goss will also act on behalf of General Electric Co. in its relations with Canadian General Electric Co., Ltd.

Houston Heat Pump Campaign Successful

HOUSTON, Texas — More than 2,000 window heat pumps and almost 600 central heat pumps—most of these sold during the last 12 months—indicate the success of the "first heat pump campaign" conducted by Houston Lighting & Power Co.

Residential sales are soaring, and there are now about 100 commercial installations totaling 1,000 tons, the power company reports.

"Our new low one cent winter rate step will create an even greater swing to the all-electric heat pump," they predict.

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Send us your space reservation today . . .
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Existing Home Jobs

(Concluded from Page 1, Col. 4)

for full-home air conditioning represents a 43% increase over 1958, and will be an all-time high for the industry.

For the first time, more of the complete systems are being installed in existing houses than in new homes, Carrier officials state.

In the past, in the over-all total of installations made across the country, 11 units went into new houses for every 9 installations in existing residences. This year the proportion has been reversed.

Third major break-through in this year's sales will be in the elimination of excessive inventories in both central residential and room air conditioners.

By the end of the year, according to Russell Gray, Carrier vice president, about six million homes or apartments will be equipped with either central or room air conditioners.

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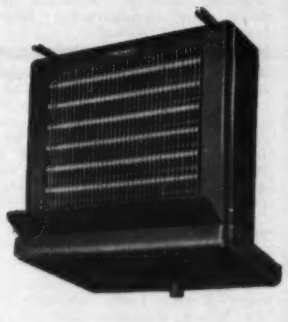

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MECHANICAL ENGINEER, age 35, single status, bilingual, available in South America for special project work or full time employment; eleven years' experience in supervision, design and installation all sizes and types air conditioning and refrigeration systems. BOX A6352, Air Conditioning, Heating & Refrigeration News.

MANUFACTURERS' AGENT — Ohio, Western Pa., Eastern Michigan. Will provide commercial refrigeration manufacturers with complete bidding service. Every job in territory will be scanned for possible use of your equipment. Material will be taken off and priced directly to large contractors. Wide acquaintance architects & engineers. Desires evaporators, condensers, reach-in refrigerators, refrigerator doors, shelving, etc. Also service O.E.M. accounts. Broad engineering background. BOX A6353, Air Conditioning, Heating & Refrigeration News.

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AIR CONDITIONING product development engineer. Desire a graduate engineer, having 5 years' experience in window and builders units models. Send resume and salary requirements to: COOLERATOR DIVISION, McGRAW-EDISON COMPANY, 704 North Clark Street, Albion, Michigan. Replies confidential.

COMBUSTION DEVELOPMENT engineer. Graduate engineer with at least five years' experience in the design of oil and gas space heating equipment. Will be responsible for product development work on oil and gas space heaters as well as electric heating equipment. Must be capable of supervising test work and secure A.G.A. and UL approvals. Will be required to follow projects through drafting and model shop and assist in establishing production and inspection procedures. Send resume and salary requirements to: COOLERATOR DIVISION, McGRAW-EDISON COMPANY, 704 North Clark Street, Albion, Michigan. Replies confidential.

ENGINEER REFRIGERATION Controls—To head a department on design and development of commercial refrigeration control valves of all types; national corporation with midwestern manufacturing and engineering facility; salary and bonus commensurate with work background and ability. Send full details, qualifications and personal data to BOX A6172, Air Conditioning, Heating & Refrigeration News.

AIR CONDITIONING engineer for design and development of package type heat pumps through 5 hp. wanted by West Coast manufacturer. Must be experienced in the design, development, and testing of residential air conditioners and capable of initiating and carrying a design to completion. State age, past experience, education and salary requirements. Our engineers know of this ad. Reply to BOX A6344, Air Conditioning, Heating & Refrigeration News.

REFRIGERATION ENGINEER wanted who is capable of designing small refrigeration systems for household refrigerators and freezers and commercial cabinets. We purchase compressors but the man we choose must be familiar with design of high-side assemblies and sizing of evaporators and fans for plated or finned coil type. Should have experience with automatic defrost methods. The man who demonstrates ability can look forward to assuming chief engineers post in future. Applicants should give complete resume of education, experience, and salary requirements. Reply to BOX A6347, Air Conditioning, Heating & Refrigeration News.

SALES ENGINEER—Major national brand air conditioning manufacturer has opening for full line sales representative in metropolitan Los Angeles market. Attractive base salary, bonus, and expenses with real future opportunity. Proven sales experience and local trade following mandatory qualifications. Send brief resume to BOX A6348, Air Conditioning, Heating & Refrigeration News.

REFRIGERATION SERVICE man wanted, must have eight years' experience in service and installation of commercial refrigeration and air conditioning. Guarantee forty hours per week, year around. State qualifications, experience, age, etc. Well established firm, central Michigan. BOX A6351, Air Conditioning, Heating & Refrigeration News.

EXCELLENT OPPORTUNITY—Leading manufacturer of air conditioning and refrigeration equipment has immediate opening for two (2) product sales managers of (1) Freon (open and hermetic) and ammonia reciprocating compressors and condensing units above 10 hp. size and packaged liquid chillers; (2) large central station and multi-zone air conditioners and blast coils—water, steam, direct expansion. Will plan and conduct product training meetings, field and factory; recommend, including functional specifications, new product line developments and coordinate with manufacturing and engineering; recommend product pricing; prepare technical literature, sales aids and product feature presentations; forecast sales; prepare product and engineering application information, including competitive studies. Applicants must be graduate mechanical engineer with a minimum of 2 to 4 years' field sales experience with air conditioning and refrigeration products as described. Compensation commensurate with qualifications. A real growth opportunity. All replies will be acknowledged and handled in a confidential manner. Address inquiries to BOX A6355, Air Conditioning, Heating & Refrigeration News.

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AJAX ICE Machine parts—We have purchased the inventory of parts, plus all tooling, for the Ajax Electric Iceman, formerly manufactured by Servel, Inc. We are now furnishing replacement parts, for all models including Ajax Pebble Machine. Catalog & prices available. AJAX EQUIPMENT CO., INC., 73 Pine Street, Montclair, N. J.

NOTICE: DISTRIBUTORS, dealers, service men, users refrigeration equipment—Repair parts available all models Baker ammonia and Freon compressors. We are exclusive Baker export sales office. Manufacturers' export agents refrigeration, air conditioning, and allied equipment. THE KEISER COMPANY, 7651 South Ashland Ave., Chicago 20, Illinois.

FOR SALE—One Mueller Climatrol oil fired forced air furnace Model 57-8, commercial type. 60 ft. ducting work and 2 oil tanks included. Complete set of controls—first class operating condition. Can be seen in operation prior to dismantling. Bonnet output, 235,500 BTU. Best price takes it. SAFFRAN ENGINEERING CO., 20225 East 9 Mile, St. Clair Shores, Michigan. PRescott 7-5300.

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ATTENTION REFRIGERATION Servicemen: Would you be interested in saving from 25 to 50% on many standard refrigeration and air conditioning parts and supplies? Send for our free circulars and catalogs. WALTER W. STARR, 2833 Lincoln Ave., Chicago 13, Ill.

ATTENTION LEADING manufacturers of refrigeration and air conditioning equipment. Are you having trouble maintaining your warranty equipment? Contact one of the most modern repair shops in Miami, Florida. We specialize in qualified mechanics and engineers. Following services are available: compressor rebuilding, motor repairs, hermetic units, heat pump modifications and maintenance. BOX A6354, Air Conditioning, Heating & Refrigeration News.

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BUSINESS NEWS PUBLISHING CO., DETROIT

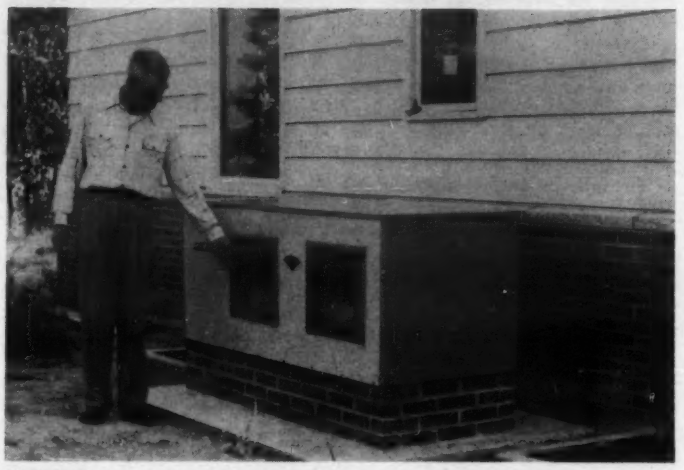
Especially In the North

Contractor Faces Numerous Problems In Designing Residential Heat Pump System

By C. Dale Mericle

OLD MISSION, Mich.—What problems is a contractor likely to encounter when designing and installing a residential heat pump system?

The problems that Joseph Sloane ran into and hopes he solved when he designed a heat pump system for a new home here illustrate the close attention which must be given to every detail.



OUTDOOR section of G-E air-to-air heat pump is raised on brick platform to minimize troubles with heavy snowfall which often occurs in northern Michigan.

Single Story Ranch House with Basement

House involved is a single story ranch style structure with full basement having approximately 2,000 sq. ft. on the first floor. It's located on Old Mission peninsula on the shore of Grand Traverse Bay. Owners are Mr. and Mrs. Walter Johnson, successful young fruit farmers with three children.

Sloane had to consider Johnson's background—M.E., Northwestern. Circuitry of the heat pump and its controls will pose no problem for the owner who is willing to experiment with the unit to achieve most economical operation.

Location: 45th Parallel

The house is about two miles south of the 45th parallel, which means it's halfway between the equator and the North Pole.

Weather is tempered by Grand Traverse Bay of Lake Michigan which almost surrounds this peninsula. Winter temperatures are almost identical to those of Lansing, the state capital 200 miles to the south where Sloane, a General Electric dealer, maintains his contracting firm, Sloane Heating & Air Conditioning.

But why a heat pump in the Johnson home anyway?

"We wanted electric heat, but we also wanted complete winter air conditioning," Johnson explains. "Summer air conditioning was important, too, but it wasn't the top consideration," he adds.

Because one of the children is troubled by asthma, Johnson wanted complete air cleaning and filtration if at all possible.

All these added up to a central air moving system incorporating an air-to-air heat pump and an electrostatic air cleaner.

With all the water in the area, a water-source heat pump was considered, but Johnson was "appalled" at the plumbing which would be involved.

Sloane got into the picture through another Lansing firm that specializes in straight electric heating systems and insulation. The latter firm, which originally had been approached by Johnson, quickly decided that straight resistance heating would not meet the owner's requirements, and so suggested Sloane and the heat pump.

Construction, Windows, Insulation Favorable

The house is tightly constructed, all windows except small ones in two bathrooms being of fixed, double glazed construction.

Insulation was to include 4 in. of foil-covered glass fiber in the walls and 6 in. blown in the ceiling. No insulation has been provided for the basement walls.

House is oriented on a North-South axis, living and dining rooms being on East side, kitchen on South end, bedrooms on West and North. There is no shading.

Average winter temperature is about 25° F.

Using -10° F. outside and 75° F. inside as winter design conditions, Sloane calculated a winter heat loss of 56,100 B.t.u.h. for the first floor and a considerably smaller though not significant loss for the basement. NWAHACA form 11 was used for cooling load calculations; form 46 for heating.

In locating equipment and laying out ductwork Sloane approached it in his usual way. First a scale drawing ¾ in. to the foot was made showing the exact location of every joist and partition.

Templates of the equipment to exact scale were also prepared so they could be shifted on the scale drawing to determine best location.

Basic approach to the duct design was a perimeter system with high inside wall returns.

Equipment Described

Equipment selected was a G-E Weathertron split type heat pump rated at 4 tons for cooling and 90,000 B.t.u. for heating (with three 6.9 kw. resistance heating elements) and an Electro-Air electrostatic air cleaner.

Outdoor section of the heat pump is located at the North end of the house where it will be protected somewhat from sun in summer yet benefit by some sunshine in winter, Sloane believes.

This section is raised about 1 ft. above grade to minimize problems that may result from winter snow, and Johnson is also having a peaked metal cover made for the unit for the same reason. Snow can be quite a problem in this area.

Indoor section of the unit, along with the air cleaner and duct heaters, is located in the North end of the basement, approximately 20 ft. from the outdoor section.

Flat Ductwork Used For Trunk Lines

Flat ductwork is employed for trunk lines while branch feeders are 6-in. round duct. There are balancing dampers in each branch. Baseboard registers are used throughout with one exception, which will be mentioned later.

System is designed to produce 1,600 c.f.m. at 0.3 in. static pressure. It was found by Sloane that the blower speed had to be reduced slightly.

In designing the air distribution system for a heat pump, Sloane points out, "it's essential to remember you're dealing with 110° air instead of the 165° air obtained from a combustion type heating plant.

"Thus, you have to handle considerably more air, and if you are to avoid drafts under these conditions you need more registers."

Sloane, therefore, called for four registers in the living room and three in the dining room, for example. In all, 20 registers are employed in the house plus six double size and

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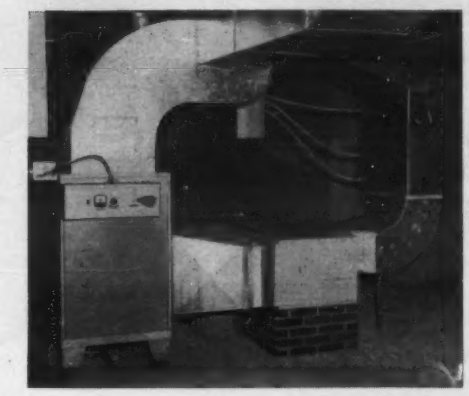
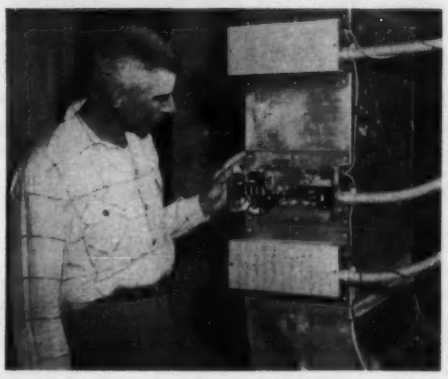


IMPORTANT feature of this heat pump system is electrostatic air cleaner (at left), which owner wanted along with electric heat and summer cooling to relieve asthma condition suffered by one of children.



WIRING of one of three 6.9 kw supplementary resistance heaters in discharge duct from heat pump is examined by owner, Walter Johnson, a graduate mechanical engineer.

INSTEAD of the usual baseboard register at the sink, register in floor beneath sink will supply air to louvers below sink edge, thus avoiding cold draft on feet of anyone standing at sink, as housewives like Mrs. Walter Johnson usually have to do several hours a day.

two standard size return air intakes.

Actual ductwork installation was made by Erven Sampson, local contractor, to detailed plans prepared by Sloane. An exact scale layout of the ducts were provided, along with detailed descriptions and isometric drawings of special fittings and a list of standard fittings, all the fittings being keyed by numbers to their location on the master layout.

"It's hard to go wrong this way, and it keeps scrap to a minimum," Sloane contends.

The building contractor, Floyd Soper, also set and wired the heat pump and air cleaner.

Another local contractor connected the refrigerant lines, and will handle service for a year.

Although the latter contractor had long experience in conventional refrigeration and air conditioning installation work and service, Sloane found he had to emphasize the extreme care required of a heat pump installation.

Outside Air Intake Provided

Special consideration was also given by Sloane to the fact there are two fireplaces in the Johnson house. With the house being so tightly constructed, Sloane provided a 6-in. round duct for an outside air intake, leading to the intake side of the air cleaner. Without this supply of outside air, Sloane fears the fireplaces would not draw well.

It it also because of the tight construction that Sloane has advised against installing a humidifier in the heating system at this time. He doubts that it will be necessary, but in any event he prefers to check the system under actual heating operation before recommending a humidifier.

Controls Described

A fully automatic room thermostat is employed with this system, permitting automatic switchover from cooling to heating and vice-versa. The heating-cooling switchover is done on a 5° differential. Anticipators are provided for both heating and cooling.

On the cooling cycle the thermostat cycles the compressor in the usual on-off manner with approximately 1° differential. On either cooling or heating the blower may be set at the thermostat for constant operation or automatic cycling with the compressor.

On heating the thermostat first calls for compressor operation. If room temperature drops another 1½°, the supplementary resistance heaters in the ductwork are cut in successively, provided outdoor temperatures are low enough.

Outdoor thermostats, mounted in the outdoor section of the heat pump, are wired in series with the indoor heating thermostat. When outdoor temperature falls to 40° F., the contacts close, permitting the first resistance heater to go into operation if the indoor thermostat calls for more heat. Second resistance heater is cut in at 20°; third at 12°.

Manual Switches Will Let Owner Experiment

Manual switches have been specially installed, however, to let the owner cut out the circuits to the resistance heaters if he so desires. In fact, Sloane, the contractor, has recommended that the owner experiment to see whether he needs all three 6.9 kw. resistance heaters in operation.

One such heater probably will be required, of course, for reheat purposes when the unit is defrosting, but there is some question whether all three resistance heaters will be needed at a single time.

Despite the fact that Sloane and Johnson are taking full advantage of the latter's ability to observe and manually operate the heat pump, both emphasize that the installation is in no way "experimental."

Need for Heat In Emergency Considered

Sloane has instructed the owner how he could disconnect the leads to the compressor if it should become inoperative and then run the system in winter on the electric duct heaters alone in case of a breakdown.

The fireplaces on the first floor and basement could provide heating in emergency.

At this time the unit has not yet been put to the test of winter heating, but it has proved its merits for summer air conditioning.

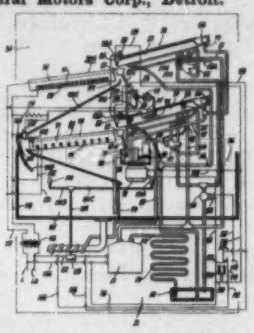
The contractor is not completely satisfied about one point, however. He feels the basement walls should be insulated. If they aren't, he wants the ducts running through the basement to be insulated. One or the other will have to be done, Sloane is convinced, but he thinks the owner would be more pleased with the results if the walls were insulated.

"SERVICING Automobile Air Conditioners" has been omitted from this issue to allow space for more information on heat pumps. Publication of the series will resume in the next issue.

PATENTS

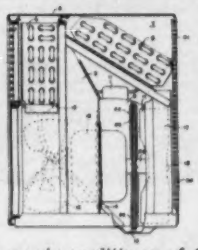
Week of May 26

2,887,863. ICE MAKER. Wendell M. Thomas, Dayton, Ohio, assignor to General Motors Corp., Detroit.



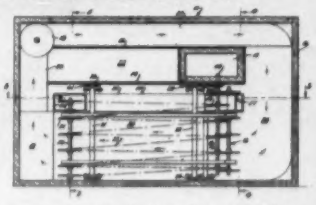
1. An ice making apparatus for cyclically freezing water into ice and releasing the ice comprising in combination, a freezing plate, means for circulating a film of water across said plate, means for refrigerating said plate to freeze water circulated thereacross into a layer of ice thereon, means for heating said plate to loosen the layer of ice therefrom thereby it gravitationally slides off the plate in the form of a slab, a thermal element associated with said freezing plate and adapted to be directly contacted by the thickness of a layer of ice formed thereon, a switch operable by said element controlling said apparatus for initiating alternate ice freezing and ice releasing cycles thereof of normal duration. . . .

2,887,854. ROOM AIR CONDITIONER CONDENSATE DISPOSAL MEANS. Robert C. Soder, Erie, Pa., assignor to General Electric Co., a corporation of New York.



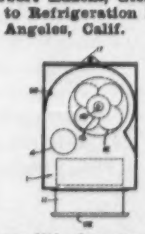
1. In an air conditioner of the type adapted to be utilized throughout the year for conditioning the air within an enclosure, the combination comprising a heat exchange apparatus including at least one air moving means mounted in said air conditioner for circulating a stream of air through said apparatus, a sump for collecting condensate water from said apparatus, said sump being positioned wherein it is exposed to outdoor temperatures which in the winter are likely to cause said condensate water to freeze. . . .

2,887,855. AIR-FREEZE MACHINE. Robert T. Glass, Austin, Tex.



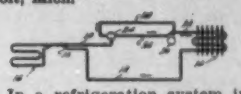
7. In a food freezing machine, a housing, a plurality of unitary shaft support members mounted therein, having spaced apart sprockets about which an endless conveyor chain is trained, each of said unitary shaft support members comprising a pair of vertical extending horizontally spaced apart support members, a top horizontally disposed member fixed as a point adjacent the ends thereof, a bottom horizontal member parallel to said top member fixed to said vertical members adjacent their bottom ends, one of said vertical members being fixed at its ends to said said housing. . . .

2,887,854. AIR CONDITIONING SYSTEM. Daniel D. Wile, Whittier, and Shizuo Robert Adachi, Glendale, Calif., assignors to Refrigeration Engineering, Inc., Los Angeles, Calif.



An air conditioning apparatus, comprising: a relatively flat substantially rectangular casing structure having an outlet opening in an end wall, and an inlet opening in its bottom wall adjacent the opposite end wall, said inlet opening being displaced from the center of said casing structure toward one of the side walls, the center of said inlet opening substantially coinciding with an involute figure tangent to the side walls of said casing structure and said opposite end wall. . . .

2,887,857. JET PUMPS IN REFRIGERATION SYSTEM. Hugh J. Scullen, Detroit, Mich.



7. In a refrigeration system including an evaporator, having an inlet and an outlet and means including at least one refrigerant compressor and a condenser arranged to supply compressed refrigerant to said evaporator inlet, the improvement which comprises an expansion vessel connected between said condenser and said evaporator inlet, restriction means connecting said vessel with said evaporator inlet, a refrigerant-powered jet pumping means having a nozzle outlet connected to the inlet of said compressor, a suction inlet in communication with said evaporator outlet, and a nozzle inlet, and passageway means for conducting refrigerant vapor liberated in said expansion vessel to the said nozzle inlet of said jet pumping means.

(To Be Continued)

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Military--

(Concluded from Page 1, Col. 3)

method of heating and cooling.

One of our problems is to indoctrinate the personnel living in the housing in the operation of the heat pump. This is a new device to the average American, and his understanding of the equipment is very limited.

At one base, the coil could be seen from inside the house. Just before the defrost cycle, when the coil was covered with ice and frost, the housewife would become convinced the "heater" was obviously not working, regardless of house temperature. Some merely called the "trouble desk" of the base engineer, while others tried to defrost the coil with bucket or hose.

One drawback to a heat pump is the heat recovery rate. Some of our personnel were in the habit of turning back the thermostat when they left the house for long periods. When the thermostat was returned to normal at one base, the strip heaters were energized and the electrical demand was excessive.

At another base, where the strip heaters were controlled by a secondary outdoor thermostat set about 35° F., the heat recovery was considered slow by some personnel.

The most serious problem encountered has been the ratings given a particular unit by the manufacturer. Some of the earlier models tested for the Air Force indicated the manufacturer was optimistic about his product. The later units tested were more nearly in agreement with the manufacturer's ratings, but tested consistently low. This was found to be true of both the heating and cooling ratings. *(See "NBS Says," pg. 29.)*

We have used the products of Amana, General Electric, Mathes, and Westinghouse.

New Commercial Standards List Now Available

WASHINGTON, D. C. — A new list of Commercial Standards revised to July 1, 1959, is now available, according to Commodity Standards Div., Office of Technical Services, U. S. Department of Commerce.

The new index lists all Commercial Standards under 22 classifications including chemicals; electrical and mechanical equipment; instruments and tools; heating, ventilating, and refrigeration; plastics; plumbing materials and fixtures; pipe and fittings; rubber products; thermal insulation materials; and others.

New standards in preparation, and existing standards being revised to reflect current industry practices are shown in a supplemental list.

Single copies are available without charge upon request to the Commodity Standards Div., U. S. Department of Commerce, Washington 25, D. C. Ask for Catalog No. 978.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

Silver Shield In Philadelphia--

(Concluded from Page 1, Col. 3)

training school using the manuals of the National Warm Air Heating & Air Conditioning Association, the sponsoring group, has been held weekly to acquaint nearly 75 local dealers in the proper way to install warm air heating and ducted air conditioning equipment.

According to A. E. Dansereau, president of the Indoor Comfort Bureau of Delaware Valley, Inc., the main event of the week's activity revolved around the first annual dinner meeting held on Sept. 15 in Philadelphia's Poor Richard Club.

A "capacity house" of over 150 people, from the greater Philadelphia area, plus representatives of manufacturers of heating and cooling equipment, were in attendance.

Some 70 individuals who recently completed the Silver Shield training program were recognized by name. Graduation certificates were mailed to them.

Featured speaker was Victor Blanc, district attorney of Philadelphia.

During the dinner meeting, the official license to operate an Indoor Comfort Bureau and sell Silver Shield Systems was presented by Harry Gurney, an officer of NWAHACA and general sales manager of the Janitrol Heating & Air Conditioning Div. of Surface Combustion Corp.

Also in attendance were members of the executive staff of NWAHACA.

Members of the Indoor Comfort Bureau of Delaware Valley are:

Erwin G. Alber, Inc., A. E. Dansereau & Co., Diamond Heating & Cooling Co., all of Philadelphia; Chris Fox, Inc., Trenton, N. J.; Gentle-Flo Co., Malvern, Pa.; Ross A. Jones, Lancaster, Pa.; Edwin J. Lynch, Chalfont R.D. 1, Pa.; Masco Heating Co., Upper Darby, Pa.

Also, National Air Cooling & Heating Co., Philadelphia; Paulsworth Heating & Air Conditioning Co., Fallsington, Pa.; R. G. M. Sheet Metal Co., Philadelphia; Frank G. Sherwood, Inc., Willow Grove, Pa.; William L. Sherwood, Philadelphia; Steiner-Smith Co., Inc., Springfield, Pa.; George E. Waldman, Feasterville, Pa.; and The Frommer Co., Advertising Agency, Philadelphia.

The Silver Shield Program has also been launched in the Greater Niagara Falls, N. Y. area. At a dinner meeting Sunday evening, Sept. 20, at the Niagara hotel, a license to operate the program was presented to the Niagara Indoor Comfort Bureau.

This brings to four the number of cities now licensed to operate the Silver Shield Program. In addition to Philadelphia, the others are Kalamazoo and Lansing, Mich.

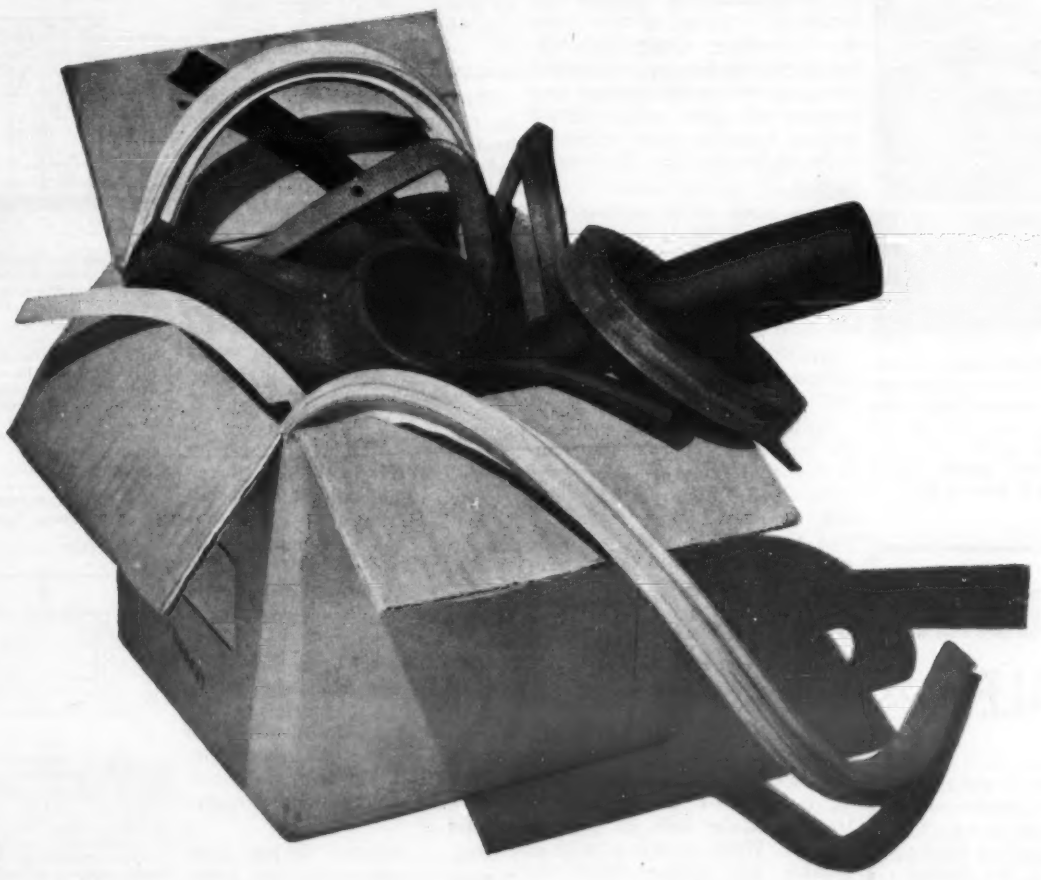
Earlier this month, dealer-contractors in the Mansfield, Ohio, and Camden, N. J. areas attended meetings at which they heard a detailed explanation of the program, according to the announcement.

Gross Electric Purchases Toledo Firm

TOLEDO—Purchase of the F. A. George Co., 3444 Sylvania Ave., by Gross Electric Co. as a new suburban West Toledo branch was announced by Richard Gross, president.

The 33-year-old George firm, a major Frigidaire appliance dealer, was owned and operated by Floyd A. George, founder, who died June 12.

B.F.Goodrich



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